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Increasing Steam Pressure.

ENGINEERING practice never stands still for long. We have been privileged to watch the reciprocating engine for driving electric generators developed from small beginnings to its limits on two main lines—high speed and low speed—and to see it superseded by the steam turbine, while the Lancashire boiler has given place to the water-tube type, and parallel changes have taken place in all other branches of power-station design; but finality is apparently remote. At present the field of most active evolution is the boiler house, where the methods of combustion and the conditions of steam generation are in course of profound modification. As usual, the merits of the new departures are being keenly debated; the use of pulverised fuel on the one hand, and the adoption of higher steam pressures on the other, are questions of the first interest to the station engineer, who has to consider not merely economy, but also other factors of equal or even greater importance, such as reliability and maintenance.

With regard to the tendency towards increased steam pressures, no great departures from customary practice have been made in this country, though Mr. Thos. Roles is carrying out an interesting scheme at Bradford, involving the superposition of an 1,100-lb. boiler and turbine on plant operating at ordinary pressures. In the course of a long and interesting report presented to the Electricity Committee of Bradford Corporation by Mr. Roles, dealing with his experiences during his visit to the United States and Canada last year, he remarks that when visiting the Hudson Avenue power station of the Brooklyn Company, which is to be one of the largest in the world, he found that the steam pressure was only 265 lb. per sq. inch, the total tempera-

ture of the steam was 611 deg. F., and retort stokers were in use. At the Hell Gate station of the New York Edison Company similar conditions were met with, and on inquiry he learnt that this conservative policy had been adopted in order to make these stations as far as possible secure from breakdown, owing to the rapid increase of the load in New York and the supreme importance of reliability. It will be borne in mind, too, that the electricity supply of New York and Brooklyn is provided by stations situated close to the load, in preference to transmission from a distance, for the sake of the greater degree of reliability thus obtained. On the other hand, Mr. Roles visited the Edgar station at Boston, where a boiler has worked for 12 months at 1,200 lb. per sq. inch, and the Lakeside power station of the Milwaukee Electric Railway and Light Company, where plant to work at 1,400 lb. per sq. inch is being installed, with pulverised-fuel firing; and elsewhere he met with boiler pressures of 550 and 650 lb. per sq. inch, with which no difficulties had been experienced. Again, at the new East River station, New York, the steam pressure is to be 375 lb. per sq. inch and the temperature 700 deg. F., with pulverised-fuel firing.

With regard to turbo-generators, Mr. Roles considers that the machines made in this country compare favourably with those in use in the United States, and attain a higher efficiency than the latter; but his general conclusion in respect of boiler plant is that American practice is decidedly ahead of that which has hitherto obtained on this side of the Atlantic as regards the size of boilers, the working pressures, the construction of furnaces, and the methods of firing and control of combustion. Experiments have been carried out with steam generated at 3,200 lb. per sq. in. and 706 deg. F.—a "critical point"—at Rugby, of which we published particulars four years ago; the North Tees power station uses a pressure of 475 lb. per sq. in., at 700 deg. F., and pressures of 600 and 800 lb. per sq. in. have been used at Amsterdam and Langerbrugge, whilst experimental work has been done on the Continent at pressures up to 1,500 lb. per sq. in.

Obviously steam generation practice is in a state of flux, with a decided tendency towards the use of pressures considerably above those usually adopted hitherto. For this reason the paper read by Mr. H. L. Guy (chief engineer, mechanical department, of the Metropolitan-Vickers Electrical Co., Ltd.) before the Institution of Mechanical Engineers, in which the author provided means for determining the economic value of increased steam pressure under any given conditions, deserves the careful attention of all engineers who are interested in power production. A full abstract of the paper is concluded in this issue, from which it will be seen that the author does not advocate either high or low pressures as a general proposition; he gives data and curves which will enable any engineer, on substituting the data corresponding to the conditions which obtain in his own case, to judge for himself the most suitable pressure and temperature to employ, so far as economy is concerned. Whilst load factors of 60 and 100 per cent. are unfortunately rare exceptions in this country to-day (though not altogether unknown), the time is approaching, we hope, when many stations carrying "base load" will work with high load factors, and no new plant in "super"-power stations should be installed without having regard to that possibility. Very high load factors *must* be obtained if electricity is to be as cheap as it should be, and if the Central Electricity Board's schemes are to be successful.

Saving the D.O.T.

SOME of the comments that have appeared in the Press regarding the future of the Department of Overseas Trade are so conspicuous for their want of knowledge that they call for a good deal of patience to read, and more to reply to them. From those who have reason to know from practical experience the usefulness of the organisation to all who take the trouble to avail themselves of its various services, there has been a general chorus of disapproval at the Government's intentions so far as they can be understood from the statements of the Chancellor of the Exchequer and the President of the Board of Trade. The Prime Minister has been asked to receive a deputation from the Association of British Chambers of Commerce, which has passed a strong resolution urging that the efficiency of the present Department should not be impaired. The suggestion that we may revert to the dual system by which the Foreign Office and the Board of Trade will both deal with questions affecting assistance to trade is viewed with dismay, as it well may be, remembering pre-war controversies. It has been suggested that those who approve of the termination of the Department include merchants who are interested in the sale of goods of foreign manufacture, but that British manufacturers and others concerned mainly with the sale of British products and therefore with the maintenance of British employment and the reduction of unemployment pay desire its good work to be efficiently continued. To suggest that the Department is not necessary, because it is only used by a small proportion of the nation, and that those who use it should bear the cost of it—is to express an absurdly short-sighted view. Shall we abandon all our Trade Commissioners because some traders ignore them? The criticisms of the Government proposals and speeches may be expected to be reflected in the reconsidered intentions when they are announced, but it is becoming increasingly obvious that as a measure of economy the scheme looks more like a piece of window-dressing than anything else, or, to speak more plainly, sheer nonsense. What folly to talk of abolishing a business-getting department at a time when one of the most vital concerns of the nation is to get business!

The Federation of British Industries has passed a series of resolutions offering its co-operation and help in securing economy in this matter with the least possible injury to national interests. It has offered to lay its views before the Government, as well as the experience that it has had of the problems involved in connection with an overseas organisation. We do not believe, however, that the trading community will desire the functions covered by the Department of Overseas Trade to be handled by any body which does not place its facilities at the disposal of all British manufacturers, whether organised or not.

The Institute of Fuel.

THE Councils of the Institution of Fuel Economy Engineers and the Institution of Fuel Technology are to be congratulated on their decision to adopt the suggestion of Sir Alfred Mond, president of both bodies, that they should combine their forces and form one authoritative and influential Institute. As we have urged in these columns, the continued existence of two institutions with practically identical aims would have led to rivalry and dissipation of effort, and certainly it had already alienated the sympathies of many would-be members, thus weakening them both; the subject with which they deal is of vital importance to this country, and it is most desirable that its investigation shall be conducted with the maximum of efficiency and concentration.

There is now every reason to believe that a career of valuable service both to the nation and to the members lies before the Institute of Fuel, which will be able to speak and act as the sole organisation fully representative of the wide and varied interests concerned in the production and use of fuel.

Electrical Development in South Wales.

The Upper Boat Generating Station of the South Wales Electrical Power Distribution Co. has been extended so as to provide for an ultimate capacity of 100,000 kW. The recently installed plant includes a 16,000-kW turbo-alternator and eight 60,000-lb. boilers.

THE official inauguration on April 26th, by the Rt. Hon. the Earl of Plymouth, of the new extensions to the Upper Boat generating station of the South Wales Electrical Power Distribution Co., marked an important stage in the development of electricity supply in South Wales.

Fig. 1.—General View of Power Station.

The power station, fig. 1, is situated on the banks of the River Taff, and is about 10 miles distance from Cardiff and two miles south from Treforest. The company obtained its supply powers in 1900 by one of the earliest electricity Acts, and building was commenced in April, 1902, the first supply being given in early 1904. The area covered is the county of Glamorgan and as much of Monmouth as lies west of the River Usk, there being certain restrictions with regard to some of the urban districts and county boroughs. The original generating plant at Upper Boat consisted of 14 Niclausse boilers supplying steam at 200 lb. per sq. in. to three Willans-Ganz sets, 1,500 kW, 11,000 V. There were other smaller power stations on the system which were eventually shut down, thus concentrating the generating plant at the station under review. The reciprocating engines were run until 1908, when a 3,000-kW Westinghouse turbo-alternator was installed, followed in 1911 by a Willans-Dick Kerr 3,000-kW set, and in 1914 by a 5,000-kW set by the same makers. The steady growth of the demand resulted in 1920 in the placing of an order with Messrs. C. H. Parsons & Co. for an 18,750-kW turbo-alternator, a wise provision being made in specifying that this machine should be designed for a steam pressure of 350 lb. per sq. in. Even before this set was working it was found that additional plant would be required, and fresh capital was raised.

In 1923 Mr. J. S. Highfield was appointed consulting engineer to the company, and he prepared a scheme which led to the extensions which are the subject of this article. Fig. 2 illustrates the lay-out of both the old and new portions of the station.

The new boiler house accommodates eight 60,000-lb. water-tube boilers. These were supplied by Messrs. Babcock & Wilcox, Ltd., four being fitted with superheaters and air-heaters only, and four with small economisers in addition. All the boilers are equipped with chain-grate stokers driven through epicyclic gearing giving eight alternative speeds. They are arranged four on either side of a well-lit firing space along which runs a railway track to serve in the event of a failure of the coal-handling plant. Coal is brought by rail from the Maes Mawr sidings of the Great Western Railway, the wagons being hauled to the power-station yard by steam locomotives.

A well-fitted control room is situated in the boiler house. The efficiency of the boilers is 83 per cent. at full load, assuming the feed-water temperature to be 200 deg. F., and the heating value of the coal to be 12,500 B.th.u. per lb.

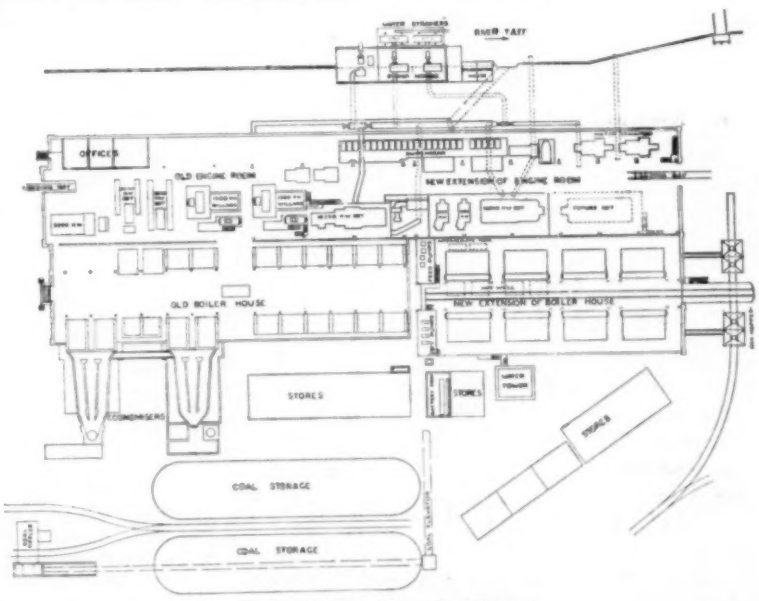


Fig. 2.—Lay-out of Upper Boat Plant.

Under the boiler house are situated two underfeed ash conveyors, each driven by a 9-h.p. motor. These remove the ash by a scraper chain from a water trough

to a 30-ton bunker outside the boiler house. Four turbo feed pumps serve the boilers, two 15,000-gal. per hour, 5,500 r.p.m., and two 27,000 gal., 4,500 r.p.m. For lifting the water from the basement hot-well tanks to those on the overhead, or fan-level floor, four reciprocating pumps are used, each having an output of 15,000 gal. per hour. The make-up water is usually taken from the river, treated and pumped into these tanks. From the head tanks the water falls to the boiler feed pumps. The induced- and forced-draught fans are housed on a floor above the boiler room, where two Weir live-steam evaporators, each capable of dealing with 3,000 lb. per hour, are installed.

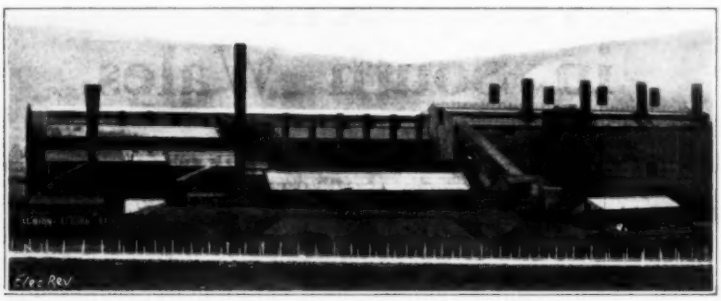
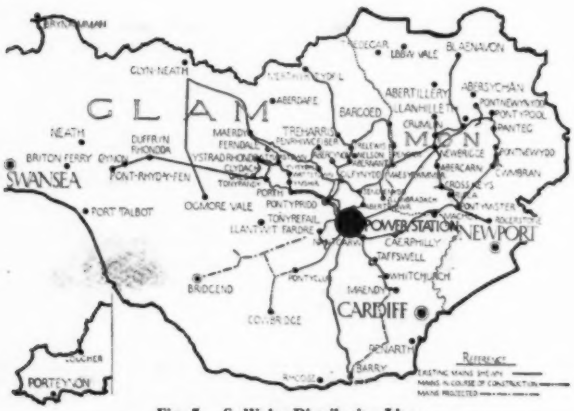


Fig. 3.—Upper Boat Station, Showing Coal-Handling Plant.

The coal-handling equipment, fig. 3, consists of a continuous-band conveyor, by Messrs. Fraser and Chalmers, which throws the coal off automatically at points where it is picked up by a travelling grab and redistributed. Successive belts take the coal into the boiler-house bunkers, each of which has a capacity of 300 tons.

The new portion of the turbine room is of modern design and well lighted, and is at present equipped with a 14,000-kW turbo-alternator, fig. 4, supplied by the English Electric Co., Ltd., 1,500 r.p.m., 11,500 V, three-phase, 25 cycles. The stop-valve steam conditions are 325 lb. per sq. in. and 725 deg. F. It is interesting to note that tenders are being invited for another turbo-alternator of 25,000-kW capacity. The turbine exhausts into a 2-flow surface condenser equipped with air pumps of the ejector type and centrifugal extraction pumps.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CARDIFF
NEWPORT
POWER STATION
PORTHCAWL
PONTYPRIDD
ABERGAVENNY
ABERTILLERY
BARGOED
CAERPHILLY
TAFFS WELL
PONTYPOOL
PONTNEWYDD
CWMBRAN
BLAENAVON
ABERSYCHAN
PANTEG
GLYN NEATH
BRITON FERRY
DUFFRYN
ONLLWYN
PONTARDAWE
OGMORE VALE
TONYREFAIL
LLANTWIT FARDRE
ABERCARN
CROSSKEYS
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the pump house and screens, and also the chlorinating plant. Owing to the sudden rise and fall to which the river is liable, this plant called for special attention. The suspended matter in the water varies greatly, and at times the contents include a good deal of slime, but it is found that the chlorination of the water materially reduces the deposit in the condensers. The screens are of the revolving type, and are fitted with two rows of internal nozzles for washing the collected matter clear. There are three main circulating pumps of Messrs. Allen's manufacture, two with capacities of 1,200,000, and one 810,000 gal. per hour.

All the feeders leaving the works are at present working at 11,000 V, although two main routes have been constructed to operate later at 33,000 V. There are approximately 102 miles of e.h.p. overhead mains and 109 miles of underground cable on the system. In every case the pressure is stepped down direct. Fig. 6 shows a section of a 33,000-V line, at present operating at 11,000 V, running down a sharp incline. A map showing the principal lines is shown in fig. 5.

The company supplies to some 80 collieries and industrial undertakings and about 22 authorised undertakers, representing an aggregate connected load of over 90,000 kW.

At the opening ceremony the Earl of Plymouth paid a high tribute to the work of the directors and staff of the undertaking, and remarked that the present output was ten times greater than that in 1908. He made a special plea for a close understanding between the directors, staff, and consumers, and remarked that the company was doing all it could for the prosperity of the district by supplying cheap power.

Mr. W. North Lewis, chairman of the company, replied to the Earl's speech, after which the visitors were entertained to tea.

We are indebted to Mr. W. A. Chamen, M.I.E.E., engineer and general manager, for the opportunity to obtain the foregoing particulars, and to Mr. C. T. Allan, M.I.E.E., deputy engineer, for his assistance in the preparation of the above notes.

Fig. 6.—33,000-V Overhead Line.

The Ideal Wiring System.

A comparison of the several wiring systems that are available, with a view to deciding which, in the author's opinion, approaches nearest to his ideal for ordinary domestic wiring.

By H. R. TAUNTON.

(*Concluded from page 672.*)

Let us turn now to the main question of "expectation of safety." It is unfortunate that in private houses this is generally less than the high-standard heavy-gauge system can give in factories and public buildings. This is largely because there is a greater tendency in a house job to keep the tube sizes down to the barest minimum, partly to avoid cutting away and partly to avoid unsightliness. There is also a greater tendency, for æsthetic reasons, to depart from the conception of a completely ironclad system, particularly at switch and fitting points. The results are defective bonding, injury to insulation by jamming and forcible pulling-in, abrasion on the sharp edges of unbushed outlets, and so on.

But the most serious troubles in a heavy-gauge conduit system are likely to be those due to condensation. And unfortunately the best workmanship is powerless to avoid them, particularly in a private house. In a factory it is possible, with care, to arrange for a certain drainage; but in a house one cannot cut joists to varying depths to allow the conduit to slope, or arrange to drain outlets to the detriment of expensive decoration. Moreover, the effects of condensation in the very variable temperature of a house are probably more definite than in an unheated factory. A watertight system which accumulates water within is the paradox that follows, and the eventual effects on rubber and steel of continual moisture are easily imagined.

I have seen a nine-year-old conduit—light gauge—represented by a red-brown streak down the wall. It will be interesting in twenty years' time to examine the condition of the thousands of heavy-gauge installations which have been put in private houses since the system came into vogue, and to see what remains of the claims of mechanical protection, flexibility, adaptability, and all the rest of it.

Let us now consider class *d*, comprising all the many systems of metal-sheathed wires which I have loosely called "lead covered." Just as heavy-gauge is admittedly the best for the majority of public buildings, so is lead-covered (or some similar system) almost as certainly the best for private-house work, particularly for surface work. Of its merits I need say no more than I have of those of conduit—the various makers' lists will more than supply the deficiency. The only criticism that is likely to be of value in the present discussion is what will not be found in those lists: destructive criticism. Suffice it to say that lead-covered

systems give all the mechanical protection necessary in practice in a private house; that they are easier to erect and far neater when erected than conduit; and that, *a priori* at least, their chances of long and efficient life are greater, due mainly to the absence of condensation.

It is when we come to estimate their chances of being erected so as to provide a reasonable margin of safety that they are easier to criticise. Apart from the possibility of damage to the core by bruising or kinking due to careless handling, their one great defect is that their efficiency depends entirely upon the care taken by the erector to bond the system throughout.

Every one of the scores of patent metal-sheathed systems includes as an essential part a series of more or less ingenious and complicated junction boxes, with elaborate clamps and terminals and a multiplicity of fiddling little screws. Assuming that a conscientious contractor, and his foreman, and ultimately his wireman, uses one of these boxes wherever one is needed—which, to begin with, is too often a generous assumption—we have still to reckon on the chances of broken clamps, damaged terminals and dropped screws. The wireman, being a very human soul, is not going to grovel among dark and dusty joists for a microscopic bit of metal, nor is he keen to dismantle his box and replace it by a new one. There is thus a great temptation to effect some sort of wedging makeshift, which works loose as soon as the floor boards are fastened down. A slovenly workman will do the same from choice, and a careless one will forget to do anything. The result is a long tale of the familiar troubles: electrolysis, corrosion at clips, cracks and pinholes, over-heating, and continual danger of breakdown, shock and fire. I am perhaps painting an over-black picture of possibilities rather than probabilities. But they are sufficiently common to justify the argument; and that they are not more common is due more to the inherent safety of electric lighting than to the so-called "foolproof" qualities of any of these lead-covered systems.

If now we turn to the last class we have to consider, c—cab-tire—we find a system which, being neither metal-sheathed nor protected, dispenses at a stroke with all need of bonding and earthing, and so with all the dangers attendant on neglect to do so. It is a system so simple to erect that a man of even less than average skill and carefulness can hardly fail to secure with it the necessary margin of safety; and in this respect—which we have agreed is by far the most important—it approaches more nearly than any other the ideal of which we are in search. It must be admitted, however, that in some other respects it does not compare so favourably with either conduit or lead-covered; so that the question whether we can make it our final choice depends on whether its shortcomings in these respects are sufficiently small to be compensated for by its definite superiority in "expectation of safety."

Before leaving the question of safety, too, it must not be overlooked that there is at least one point where carelessness in erecting cab-tire may mean potential danger. In stripping off the outer sheathing when preparing the ends, a man is apt to injure the inner insulation of the conductors at the point where they are in closest contact, emerging from the sheath. There is the same danger, of course, in lead-covered twin cables, but it is somewhat greater in cab-tire, as the difference in "feel" between the sheathing and insulation is not enough in itself to arrest the knife at the crucial point. It is a risk, however, which the competent erector avoids easily enough in practice, whether with cab-tire or lead-covered.

An obvious point where cab-tire compares poorly with conduit and, in a less degree, with lead-covered, is in mechanical protection. Certainly it would not stand attack from a nail or a sharp cutting instrument as would conduit. On the other hand, such possibilities, which it has already been argued are almost negligible in a private house, can be guarded against easily enough in various ways. It has been suggested, for instance, by certain cab-tire makers that chases for concealed wires can be made good with cement floated directly over the wires. They may be right, but it is not an appealing suggestion. In such cases some form of metal protection seems to me to be preferable, such as painted steel strip, or sherardised capping, or oval tubing.

Protection for cab-tire between floors and ceilings should be less necessary than it is for v.i.r. cables threaded through joists. It is a fact, however, despite disclaimers to the contrary, that rats *will* attack cab-tire, as indeed they will v.i.r. or wood casing, or anything else they can get their teeth into. I remember, some years ago, sending to a well-known firm of cab-tire makers some samples, taken from a rat-infested country house in East Anglia, which were a convincing proof of its susceptibility to attack by vermin. The fact was beyond dispute; and in due course I was sent a special coil of cab-tire, the rubber sheathing of which, the makers wrote, had been specially impregnated with some dope abhorrent to rats. They asked me to make a test of it. As it happened, it was a long time before the opportunity occurred to install it in a suitable house; and then the results were negative. A year later the cab-tire was untouched; but that proved nothing one way or the other. However, I cannot believe that any rat—unless there are dietetic faddists among rats as among humans—would make a meal of hard rubber unless he were forced to it by circumstances. Rats, like rabbits and other rodents, are accustomed to use definite run-ways, and the probability is that the original cab-tire happened to have been fixed across one of these tracks and was only attacked by way of removing an obstacle to traffic. In rat-infested houses, therefore, it should be possible to guard against such attacks by a little discrimination in arranging the run of the cab-tire.

Another point on which cab-tire is at some disadvantage compared with lead-covered cable for surface work, is that of sightliness. Lacking a metal casing, it is less rigid and more difficult to erect in clean, straight lines. However carefully a twin 3/22 circular c.t.s. cable is erected, and with however many clips or saddles, it is impossible to run it with the mathematical neatness of, say, Stannos, or a Henley twin. The objection can be largely met by using twin 1/.044 flat instead of the stranded circular, the greater stiffness of the wires and the wider section of the sheath assisting it to keep its shape. The flat cab-tire, too, casts a smaller shadow—and it is the extent of its *shadows* which largely determines the sightliness or otherwise of any surface system, a point not always realised. In practice, the smaller the shadow the less the wiring is noticed, irrespective of its actual size. From that point of view I would suggest that a D-section cable with a smooth matt surface would be the best possible for surface work, if practicable from a manufacturing point of view.

Another drawback to the use of cab-tire is that none of its makers have provided cheap and *simple* joint boxes for use with it—or if they have they do not seem to be proud of them, for we never hear of them. In the absence of the complications of bonding it should surely be an easy matter to design a plain non-metal box with terminals for jointing, teeing, or looping. As it is, one has to make shift with such unsatisfactory substitutes as three-plate ceiling roses.

Another minor drawback—an artificial one created by the I.E.E. rules—is that it is not easy in a cab-tire installation to comply with the regulation providing for the earthing of domestic apparatus. That, however, will not unduly distress the common-sense of the contractor, unless something of the sort is needed in a bathroom, and there the proximity of waterpipes suggests an easy solution of the difficulty.

There are perhaps other small objections to cab-tire, as compared with other surface systems, which I may have overlooked—always ignoring the question of cost, which in any case is a small matter, one way or the other, with any of these systems. The sum of all its

minor drawbacks, however, does not, in my opinion at least, outweigh its manifest superiority over others in the facilities it offers for the erection of a safe and trouble-free installation. It will be gathered, then, that cab-tire is my final choice. If, as premised in the second paragraph of this article, I were wiring my own house regardless of cost, it would be with cab-tire, everywhere concealed, and protected, where really necessary, by narrow sherardised capping or the like, and fitted with solid hardwood switch and fitting blocks, fireproof lined and painted, and with some simple form of insulating junction box wherever required.

That, in fine, is my personal ideal of a wiring system for private houses. It is waiting for the ideal client of my imaginative dreams who will some day come to me and say: "I want my house wired in the safest and most permanent way, on the best possible system. I leave details to you—hang the expense!"

The Electric Furnace in Industry.

The rise of a formidable competitor to established methods of industrial heating.

(COMMUNICATED.)

A CAREFUL perusal of some of the results which are gradually becoming available of the application of electricity to industrial heating and metallurgical operations, varying from the fusion of metals down to operations at lower temperatures such as carburising, annealing, normalising, reheating, and japanning, show that for many of these processes the electric furnace has definitely passed out of the realm of laboratory appliances, and is now about to take its place as a serious competitor of some of the older established systems of heating, particularly gas and oil.

Up to the present, the amount of available information upon industrial processes served by electricity is scanty when compared with the figures which are available in respect of competitive fuels which have been longer in the field, but recent electrical process is decidedly interesting to the manufacturer who is seeking a system which combines close (and sometimes automatic) control of temperature with a cost which does not exceed that of gas. On account of the paucity of data, there is a slight difficulty in making rough comparisons in deciding which out of the many and varying figures which are available for other systems shall be taken as typical results. The fuel cost per unit of output (although it is only one of the factors which require to be considered in furnace work) is usually the most important item, and certainly one which receives first consideration when any new installation is contemplated. It is interesting, therefore, to notice that some of the recent electrical results compare favourably with the fuel costs for similar operations when gas is used, as it is probable that it is with the latter fuel that electricity compares most closely in heat-treating operations, and with which competition is likely to be keenest in the early stages of the trade. As a basis of comparison for arriving at the £ s. d. aspect of fuel costs, as distinct from actual thermal efficiency, it would be reasonable to base the respective prices upon the rates charged in a typical Midland centre where the use of both gas and electricity for general industrial purposes has been well developed by the respective supply undertakings. Electricity is taken at .75d. per unit, which is the actual figure for a low-voltage supply, although high-voltage is available on slightly more favourable terms; gas is taken at 2s. 3d. per 1,000 cu. ft. In some of the common processes which absorb the greatest numbers of furnaces of all systems, some recent results compare as follows:—

Process.	Gas per ton output. Cu. ft.	Price.	Electricity per ton output. Units.	Price.
Melting, brass	7,324	16s. 5d.	224	14s. 0d.
Annealing, mild steel ...	6,253	14s. 1d.	191	11s. 11d.
Annealing, nickel or metals at 750 deg. C.	5,734	12s. 10d.	167	10s. 5d.
Annealing, brass	4,060	9s. 1d.	121	7s. 6d.

Against the fact that the electrical results quoted are isolated instances, compared with figures selected from a mass of results obtained in an industry wherein development has been intensive for the last fourteen or fifteen years, it is justifiable to infer that even the electrical figures quoted will be improved upon as this type of furnace comes into more general use. Such figures, however, make it evident that the use of electricity for metallurgical operations is destined to increase greatly in those districts where the supply authority is sufficiently far-sighted to appreciate the influence of such a load upon revenue, and able to put into force a tariff which will encourage the development of the trade.

Apart from the consideration of price, there appear to be at present two main obstacles to be overcome before the use of electric furnaces can become as general as gas. The first is the scarcity of electrical engineers who have specialised upon the metallurgical side. An electric furnace, to be successful, has to combine the experience of the electrician and the experience of the metallurgist, and at the present time the number of instances is very small indeed of electrical training being combined with a thorough experience of the hundred and one different trades and processes to which such plant has to be applied. In the construction of coal, gas, and oil furnaces, the problems encountered are comparatively simple, and there is little in the design of such plant that an efficient engineer or designer from any other branch of the engineering trade cannot readily cope with; the most valuable part of the experience of the designer and the most difficult of acquisition is the requisite wide knowledge of trades and processes, each one of which has its special requirements and prejudices, joined to an equally thorough knowledge of the possibilities of his own medium applied to such processes. The latter must be sufficient to enable figures to be quoted as to consumption, output, and upkeep, in terms which usually have to be so precise as to amount to a guarantee if business is to be secured. If the older branches of the industry are none too well provided with designers of this wide experience, the number is bound to be far less on the newer electrical side, which obviously necessitates considerably higher qualifications, and it is this aspect of the personnel question which will have a material effect upon the rate of progress of the electric furnace for some time.

Apart from the need for increased study of metallurgical problems and general heating work by electrical engineers, the other obstacle which requires to be overcome is the scarcity of effective publicity on the subject of what can be done by electricity in this new field. Before any considerable progress can be made, there is need for publicity of the type which is so well provided by the Electrical Development Association for domestic apparatus. In this connection, it is interesting to recall that the co-operative publicity of the gas industry in the first stages of the movement was concentrated exclusively upon domestic appliances, in precisely the same way as in the electrical trade. Given the necessary publicity and continued interest, recent developments show clearly that it is in the power of electricity supply undertakings to develop a considerable industrial furnace load with profit both to supplier and user.

The Cork Broadcasting Station.

Brief technical details of the "Standard" equipment installed in the new Irish Free State station, including the latest form of condenser microphone.

THE new broadcast radio-telephony transmitting station at Cork, which was formally inaugurated on April 25th by Mr. J. J. Walsh, Minister of Posts and Telegraphs, has been built to serve the South and West of the Irish Free State, in which localities crystal set users have hitherto not had reasonable reception facilities.

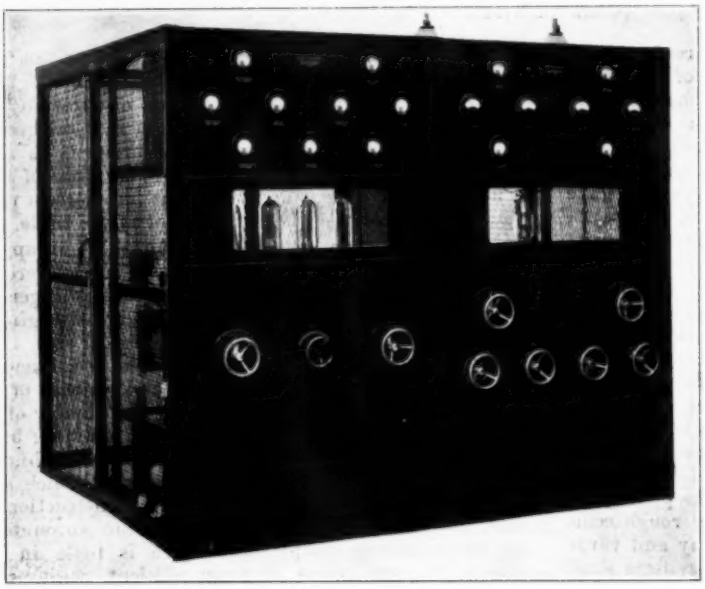


Fig. 1.—"Standard" Broadcasting Equipment at Cork.

The power required to operate the complete station is 9 kW, but its Geneva rating is 1.5 kW: that is to say, 1.5 kW is fed to the oscillator, which, in turn, delivers 1 kW of unmodulated power to the aerial system, so that with 100 per cent. modulation a "peak" power of 4 kW can be dealt with by the apparatus without introducing distortion. The station is operating on a wave-length of 400 metres and its call letters are 6CK.

The aerial and earth equipment was constructed by the Ministry, and proved to be a somewhat difficult undertaking, as it has been erected on the elevated site of the disused prison at Sunday's Well. The inverted L-type aerial, consisting of four wires each 156 ft. long, is supported by two masts 100 ft. high. The 7/22 s.w.g. buried earth mat covers an area of 20,000 sq. ft., and facilities have been provided for the use of an insulated counterpoise, if required. Motor-generators fed from the public electricity mains provide the entire power required for the plant.

The transmitter, erected by Standard Telephones and Cables, Ltd., is modelled on the same lines as 38 stations which this company and its associates have constructed in various parts of the world. In the modulation system the carrier current is generated at a very low-power level by means of a specially stable master oscillator, which maintains the frequency constant to less than 0.01 per cent., and the modulation is performed at low power, the modulated wave being subsequently raised to the output level by successive stages of power amplification. The carrier frequency is entirely unaffected by modulation, so that the highest quality is maintained, even when the transmission conditions are so bad that fading is noticeable, or when the receiver is placed in a badly-screened position.

The aerial is capacitatively coupled, which arrangement secures high quality, regardless of the percentage of modulation, and also minimises the radiation of harmonics of the carrier frequency, so that interference with wave-lengths other than that used is reduced; the characteristic is maintained approximately flat up to at least 80 per cent. modulation, and a further advantage of the system is the silence of the carrier, no sound being perceptible until modulation actually commences.

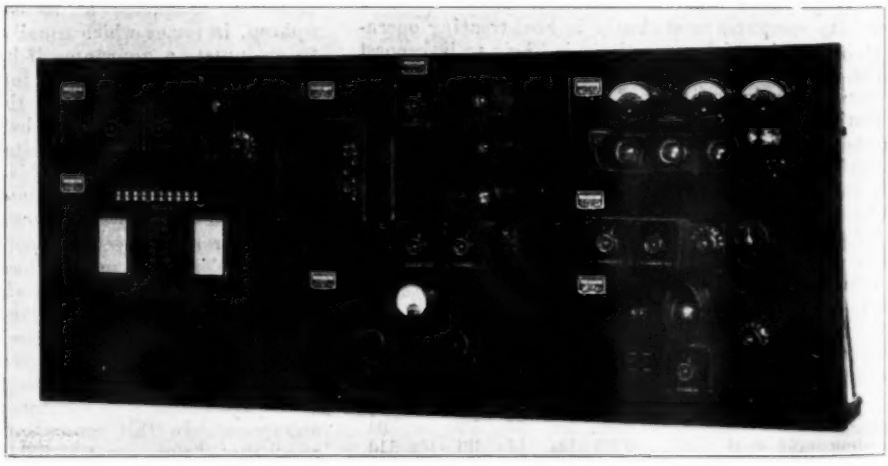


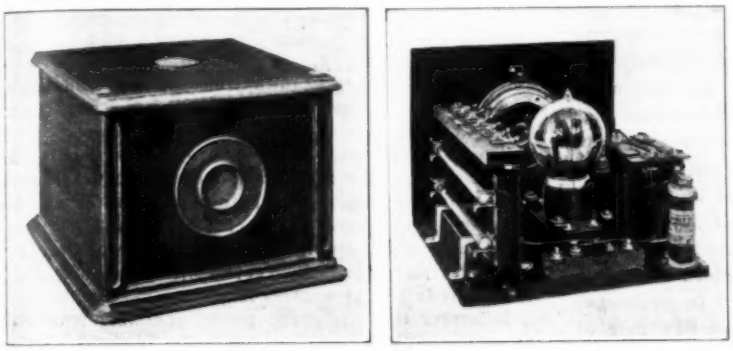
Fig. 2.—Speech Input Apparatus in the Control Room Adjoining the Studio.

The transmitter is designed for operating upon any wave-length between 200 and 600 metres, and can be changed over from any one wave-length to any other within this range in about 20 minutes. The equipment (fig. 1) is neat and completely enclosed at the

back by a protective cage; a protective relay system has been provided, the operation of a single press button starting or stopping the whole unit.

The master oscillator, a Colpitt circuit using a 4211-D valve, is contained in a brass-lined box in order to eliminate interference by external fields: its high-frequency output is fed to the grid of a 4211-D master separator valve, the output of which is bridged by a non-inductive potentiometer, by means of which the feed to the modulated amplifier is regulated.

The level of the incoming speech currents is suitably reduced by an attenuating network and supplied to the input transformer of the 4211-D speech-amplifying valve, the output of which is choke-capacity-coupled to a 4212-D valve acting as modulator; the latter further



Figs. 3 and 4.—Condenser Microphone, with and without Cover, showing Amplifier.

amplifies the voltage variations corresponding to the speech, and sets up across a high-impedance choke coil (actually two coils in series) in the common high-voltage lead to the modulator and modulated-amplifier valve a correspondingly varying potential difference, which is thus impressed upon the high-voltage supply to the modulated-amplifier valve; the high-frequency output of this valve is thereby modulated in accordance with the voice-frequency currents supplied to the input terminals. This method of modulation is known as the "Heising" or "constant-current" method, and has been proved to give the highest-quality reproduction.

The modulated amplifier and all the subsequent ones are biassed to "cut-off," enabling the whole of the valve characteristic to be used to ensure maximum output: capacity coupling eliminates radio-frequency harmonics generated in the amplifiers, the output in each case being transferred to a tuned inter-stage circuit through a "stopping" condenser; any speech-frequency components which, if allowed to pass, would introduce distortion are bye-passed by means of large radio-frequency choke coils shunted across the tuned circuit. In each case a non-inductive resistance across the coupling generator maintains a steady load on the preceding amplifier by reducing the percentage variation due to fluctuation in the grid impedance of the next stage.

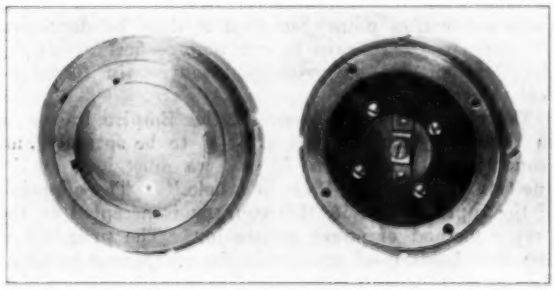
The first power amplifier stage consists of two 3212-D valves in parallel and the final stage of one 4288-A water-cooled valve; in the first amplifier stage, inter-valve oscillation or "singing" is prevented by radio-frequency chokes in the plate circuit of each valve. Initial adjustment of the tuned circuits is made at the back of the units by varying in steps both the inductance and the capacity, to permit proper matching of impedances between the output circuits and the valves: fine adjustment is made while the transmitter is actually operating by geared handwheels on the front of the panels, which operate sliders on the last three turns of the coils.

In both the power-amplifier stages the plate current return leads are connected to the electrical centre point of the filaments in order to ensure freedom from ripple and equalisation of the load on both halves of the filament; the centre point is obtained in the first stage by means of a capacity bridge across the filament bus-bars, and in the second stage by means of a resistance-capacity bridge similarly connected; both stages are fed by the same generator. In addition, in the filament circuit of the second stage there is a reversing switch for periodically changing the direction of the current through the filament and also a compensating resistance for accommodating valves having different filament characteristics, the proper adjustment being indicated by a letter etched on the glass of the valve. The oscillator-modulator also contains smoothing systems in the plate and grid supply circuits. The output of the power amplifier is transferred through a "stopping" condenser to a tuned closed circuit, which provides for the elimination of harmonics and for the proper matching of impedances in the amplifier plate and aerial circuits. Capacity coupling is used between this circuit and the aerial circuits, the coupling condensers being common to both circuits and variable for regulating the power supplied to the aerial and for enabling aerials differing in radiation resistance to be used.

The filaments of all the valves are heated by a 24-volt generator, and by inserting resistance elements the voltage is reduced to 14 for the 4212-D and to 10 for the 4211-D valves; the resistance is divided, half being placed in each side of the circuit so as to enable the electrical centre-point to apply to all filaments equally. The plate of the water-cooled power amplifier valve operates at 4,000 volts above earth potential.

In the power circuits contactor 1 is controlled by the push-button switch and, when it operates, makes the field circuit of the 24-V generator, across which is a time delay relay so set as to allow 10 seconds for the filament of the power valve to heat up before the plate voltage is applied; it can only operate when the gate switch is closed, and closes the circuit across the 250-volt generator for contactor 2, which makes the field circuits of the high-voltage machine; the field current is also obtained from the 250-volt generator. An overload relay in the high-voltage return circuit operates if the total plate current exceeds some definite value, when it makes the circuit for contactor 3, which on the second contact breaks the circuit of contactor 2 and the high-voltage generator field.

In addition, speech input equipment (fig. 2) has been provided in the control room adjoining the studio, which can be used either with a double-button carbon microphone or condenser microphone; the latter consists of two metal diaphragms separated by an air gap



Figs. 5 and 6.—Condenser Microphone, Front and Back Views.

of 1/1,000 in., 150 volts being applied between the plates and the varying capacity resulting from speech vibration used to produce the speech currents. The instrument (figs. 3, 4, 5, and 6) is identical with that used by the Comite Consultatif International des Communications Téléphoniques à Grande Distance for the construction of an "ideally perfect" telephone system for use in its laboratories as a standard for comparison.

Imperial Development and Co-ordinated Investigation.

Transport is the key: Is it possible to build electric railways in the first instance? Geological surveys, combined with systematic co-ordinated investigation of natural resources, may lead to the development of cheap electric power and the establishment of industries to form a basic market therefor.

By DOUGLAS SPENCER.

WHILE all of us feel that psychologically the British Empire is developing on the right lines, few of us, we believe, will maintain that its development physically is being carried out on lines which, from the point of view either of speed or economy, can be considered to be the best to follow.

In looking at the question of Imperial development, or settlement, one is conscious of the existence of some sort of inertia, which in itself is so complex that it is highly difficult to analyse and therefore to overcome. None the less, as compared with the pre-war rate of progress, events are moving fast. Rustic knowledge of the Empire's resources has increased enormously. The events of the war have given us a much more intimate acquaintance with the Empire's varied inhabitants. The Imperial Conference itself, though but a triennial occurrence, is undoubtedly a great educative event, which has an immense Imperial advertising value, apart from the tangible results accruing from such meetings of Imperial statesmen.

Recent events have certainly turned the thoughts of the man in the street to Imperial matters to an extent not experienced before, and his thoughts are kept in Imperial channels by such bodies as the Imperial Economic Committee and the Empire Marketing Board.

There is always an extraordinary reaction taking place between buyers and sellers. A notable example is the case of Norway, whose experiments in partial prohibition threatened her fish and other trades with the wine-producing countries. It is the old story of the contra account—as between nations; so, when the Dominions carry out a zealous campaign for advertising and selling their waves, we anticipate an increased readiness on their part to purchase our goods.

The importance of the Dominion and Crown Colony markets is obvious to all interested in electrical manufacture, and it is therefore essential that it shall not reach saturation point, but that it shall be developed by every possible means in our power—first of all, by the development of primary resources in foodstuffs and minerals.

The electrical development of the Empire to-day is in that early stage where, if it is to be speedily and economically carried out by us, we must look at the question broadly and "see it whole." The adoption of the super-station in this country is accepted as the proper method of power generation. The principle is one that holds good equally in the component parts of the Empire, to foster the development of primary industries. The difficulty is how to find a super-load in sparsely-populated districts.

In some countries the basic electrical load is industrial and domestic; in others a wood pulp and paper industry; in others electro-chemical and metallurgical; in others mining and irrigation. There is no nation in the world which has to consider such a varied set of circumstances in the matter of the application of electrical energy as is to be found in the British Empire.

In examining an electrification project of any kind, we are naturally inclined to look for population as the key to its payability. But there is reason to believe that in most of our examinations we are liable to look too much at one particular phase of the possible uses of electricity.

The less developed countries are a very fruitful field for research. The Rjukan hydro-electric developments in Norway were not caused by population or anything already in existence, nor were the small electric railways between Notodden and Rjukan, nor was the electric railway from Lulea to Narvik in the Arctic Circle, though it is 476 kilometres long.

Wherever there is cheap power available from water as at Rjukan, or from coal as at the Witbank Colliery, there is room for the examination of the development of electrical energy on other lines than those to which we are accustomed in this country.

There are electrical schemes depending on electro-chemistry alone or on electro-metallurgy with no pre-existent industry. There are railways electrified where the passenger traffic is negligible.

There are in the British Empire countries in which somewhat similar developments might take place, each by itself. There are others, in which the establishment of an electrochemical or a metallurgical industry might cause power to be developed so cheaply that the electrification of existing railways and the building of new electric railways might become possible.

Transport is undoubtedly the key to Imperial development. Electrical transport should always be a very early consideration instead of being regarded as only possible of realisation when the country is in an advanced stage of development. A far from unimportant feature in connection with railway electrification is its effect on the siting and grading of the track by reason of the increased gradients which can be dealt with by electric locomotives.

One of the first questions a pioneer Government must ask is: "Is it not possible to build an electric railway in the first instance? Can heavy power using electro-metallurgical and electrochemical industries be established to form a large basic market for power, or can other industries be fostered to help in creating a market for power so that we may have cheap and efficient transport?"

The careful geological surveys which have been carried out in the Dominions, and similar surveys which have been or are being made in the Crown Colonies form a very real basis on which to consider this question of development of the Empire by electricity. It is a process which is gradually being carried on in certain parts of the Empire, but one, the applicability of which to other parts of the Empire is left too much to chance, instead of being taken care of by a careful and systematic examination of the resources and power possibilities of the various component parts of the British Commonwealth of Nations.

Little by little the power possibilities of the British world are being realised, but it needs the combined brains of power engineers, electrochemists, electro-metallurgists, mining engineers and electricity supply and traction experts to work out a comprehensive scheme of development.

Canada is the one outstanding example of the utilisation of power possibilities to establish what are really primary industries, though some by speedy development have taken on the semblance of secondary industries.

Intensive agricultural development is naturally the first objective, artificial fertilisers and cheap transport follow as a corollary, and later comes the smelting of the native ores.

Calcium carbide and zinc have given Tasmania its electrical opportunity. Public utility demands and agriculture have given a similar impetus to the use of electricity in New Zealand. Zinc mining gives a market of some hundred million units per annum in one district alone of the Federated Malay States. Ceylon is about to develop her water power for public utility and tea estate purposes. The cotton mills of Bombay draw their motive power from the Western Ghats. The gold mines of Johannesburg are worked by power from the Witbank Collieries.

All these developments have taken place within the last 20 years. It needs only intensive and co-ordinated thought to achieve like accomplishments in other parts of the Empire, and we should like to see closer attention devoted to the question of trying to develop similar activities in all parts of the Empire by those who are acquainted not only with the resources of those parts, but also with the means whereby those resources can be utilised.

Wireless Retailers' Association.

Annual Meeting.

THE annual general meeting of this Association was held on April 6th. The Council and officers for the ensuing year were elected, and several alterations in the rules were passed after discussion. The hon. treasurer, Mr. H. C. WILLARD, reported that the financial position was eminently satisfactory.

In the course of his address, the Chairman (Mr. HORSEY) said that numerous manufacturers, factors, and wholesalers were being constantly seen and communicated with regarding the interests of members and dealers generally. The efforts made by the Association in connection with the allowance of discounts to persons not entitled to trade terms alone had occupied an immense amount of time and trouble. The policy of circularising the trade on matters of general interest had been continued. A questionnaire was sent to some ten thousand retailers all over the country, and resulted in a mass of valuable information which had been duly collated and considered. The increase in membership was greater than in any preceding year. There was no better way of achieving the objects of the Association in important centres than by the formation of branches. Although every encouragement was given by the Council to those who would undertake the task, it was a matter for regret that more of them had not materialised. Since the last annual meeting the two associations, the S.R.M. and the N.A.R.M.A.T., which were then in negotiation, had amalgamated in the Radio Manufacturers' Association. So far as this materialised the policy, so long advocated by the W.R.A., of one association for each section of the trade it had their warmest welcome. The new body had not yet been long enough in existence for it to be known whether it was going to be an improvement on the older organisation in putting co-operation in the forefront of its policy. It was a matter for great regret that the factors and wholesalers had not yet taken the initiative in forming an association of their own. They felt that as the other great distributing section of the trade, a separate organisation representing them collectively would be a signal advantage. One or two matters could only be remedied by very special treatment and particularised organisation. These were price maintenance and the allowance of discounts to persons not entitled to them. Some little time ago the Council appointed a committee especially to consider price-cutting, and it concluded that it was necessary to form an association equally representative of manufacturers, factors, and retailers on the basis of the Proprietary Articles Trade Association, and that the object of such an association should be the taking of all legal steps to deal with the cutting of prices and the granting of trade terms to those not entitled to them. It recommended that the leading factors should be invited to meet it with a view to a joint consideration of the matter. The W.R.A. would use its utmost endeavour to secure the establishment of an organisation framed on the lines of the P.A.T.A. A number of leading factors and manufacturers held identical views, and many of them had already discussed the subject with them. Regarding the broadcasting programmes, Mr. Horsey said that an unofficial Trade Advisory Committee had been formed, but he thought that a committee appointed by the B.B.C. would be more acceptable. They claimed that their efforts to prevent the proposed raiding of broadcasting funds resulted in greater sums being made available for the broadcasting service than had been contemplated by the Government. It was still considered that the amount now allotted to broadcasting was too small for a service of such great recreative and educational value to the whole nation.

In conclusion, he said that it was more than ever necessary for them to hold together and to make their position impregnable against all assaults. They had recently seen the payment of a considerable sum to assist the formation of a rival retailers' association and the offer of free office accommodation. It was impossible too strongly to deprecate the dependence of any retail organisation on the subsidies of manufacturers. There was only one reply to that sort of thing and that was so to organise and strengthen the Association that no inducement, however great, would be able to split the ranks of the retail trade.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

Broadcasting on Trains.—On April 26th, Mr. DAY asked the Postmaster-General if his attention had been drawn to the coaches attached to trains on the Continent, in which a full service of broadcasting programmes was supplied to travellers on those trains; and whether he had received representations, requests, or applications from any of the railway groups in Great Britain for permission to install a similar service on the long-distance trains in Great Britain.

Sir W. MITCHELL-THOMSON said that he was aware that broadcast receiving sets had been installed in long-distance trains in some countries. Experiments conducted some years ago in this country showed that it was possible to receive broadcast programmes on trains in motion, but no application had been received for a licence for the permanent installation of receiving apparatus in trains.

Electricity in Mines.—On April 27th, during a debate on accidents in mines, Mr. PALING said that in Germany, where there was a far bigger proportion of winding engines driven by electricity than in this country, the number of accidents from overwinding was very much less. He asked what was being done by the Mines Department to encourage the use of electrical winding engines in this country. At the pits where electric lamps had been adopted the illumination was much better than was obtained by the ordinary flame safety lamp. But, after nearly 15 years' experience of electric lamps, there were still in use 580,000 ordinary flame safety lamps, as against only 366,000 electric lamps. One of the best ways of getting rid of miners' nystagmus was to adopt electric lamps. The main reason for not adopting the electric lamp was expense.

Mr. WALSH contended that many of the accidents in mines were directly traceable to the use of electricity. It was time that a new inquiry into accidents should be set up, or a new code of legislation established to deal with entirely new conditions.

Col. LANE-FOX, the Secretary for Mines, in reply, said he would be surprised to learn that it really was the policy of the Labour Party and of the Miners' Federation to discourage the use of electricity in mines. By all means let them make the use of electricity safer, but to talk about electricity as a danger that ought to be avoided was not the considered judgment of either the Miners' Federation or the Labour Party. One of the complaints that the Miners' Federation made before the Royal Commission was that this country was behind the times as compared with other countries with regard to electrical equipment in mines.

Wireless Calls to America.—On April 27th, Sir F. WISE asked the Postmaster-General if he could state the number of wireless calls between Great Britain and the United States of America from January 1st to the most convenient date; and if the service was paying its way.

Sir W. MITCHELL-THOMSON said that the total number of calls up to and including April 24th was 769. The service was not yet self-supporting. Receipts at present covered working costs, but not interest and depreciation.

Electricity Schemes.—On April 26th, Mr. KELLY asked for the number of schemes which the Electricity Commissioners had placed before the Central Electricity Board; and how many of such schemes had been sanctioned by the Board.

Colonel ASHLEY said that a scheme relating to Central Scotland had already been prepared by the Electricity Commissioners and transmitted to the Board for consideration. The preparation of a second scheme, namely, for Central England, was in an advanced stage.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

Metro-Vick Actors.

The Metropolitan-Vickers Dramatic and Operatic Society has added to an already long list of successful productions an excellent presentation of Ian Hay's play, "The Sport of Kings," given from April 27th to 30th in the well-equipped theatre which is part of the Metrovick Club, Stretford. The Metrovick Dramatic Society has now been in existence about seventeen years, during which time it has produced a large number of plays and musical comedies, some by well-known authors, but quite a number the original work of its own members. Amongst amusing productions in the latter category may be recalled "Polly Phase, or Life's Little Worries," and "Ali Baba and the Forty Salesmen."

Electricity in a Housing Scheme.

Upon the Richings Park Estate at Iver, Bucks., about two hundred houses, forming part of an estate, which will eventually comprise 2,000 houses, have been erected by the estate company, and each house has been equipped with electricity for lighting and heating and with electrical labour-saving appliances. Every room is installed with lighting points, and power plugs are fitted in the living rooms for use with electric fires, electric cleaners, &c. Two electric radiators are supplied as part of the property conveyed in the inclusive cost of the house, and other "owner's fixtures" include an electric cooker and electric washer in the kitchen, as well as an electric towel rail in the bathroom. Furthermore, each house is equipped with a complete two-valve radio set with loud speaker. Electricity is available at reasonable rates. The whole of the electrical fittings, fixtures, and household appliances, are of the "Magnet" type, and have been supplied by the General Electric Co., Ltd. The wireless sets are "Gecophone" models.

The Electrical Contractors' Association.

The Council has nominated Mr. W. A. Shaw, of Stockport, as president of the E.C.A. Allied Associations for 1927-28. Mr. Shaw has already occupied the position, having been president in 1912-13. Mr. W. H. Walton will continue in office as vice-chairman. The Association has produced a brochure in which are outlined the history of the organisation, its aims, and its achievements. That the Association is a "paying proposition" is emphasised in the publication, a fact which should impress those contractors who are not yet members.

Australian Company's Change of Name.

The Sydney *Sun* reports that the English Electric Co. of Australia, Ltd., proposes to change its name to Standard Waygood, Ltd. In a circular to its shareholders, the company stated that 5½ years ago it purchased from the English Electric Co., Ltd., for £10,000 in cash, the £100,000 "A" ordinary shares issued to it eighteen months previously, when arrangements were made to use its designs and to represent the company in Australia. An agreement was made under which the company was permitted to use the words "English Electric," and to build electrical machinery of certain classes on the payment of royalties. The agreement proved unsatisfactory, and was terminated by mutual consent on February 28th last. The manufacturing licence from C. A. Parsons & Co., Ltd., was extended to cover the electrical generating plant of all descriptions.

Unemployment in Germany.

The returns of unemployment in Germany show that on April 15th the total was 1,221,000, as compared with 1,659,000 a month earlier.

Swedish Activity in Russia.

It is reported from Moscow that the Soviet Concessions Commission is in negotiation with the Svenska Allmanna Elektriska A.B., with a view to the latter's establishing works at Yaroslaff for the construction of electrical machines.

Austrian Electrical Industry.

The *Monthly Review of Central Europe*, produced by the Anglo-International Bank (Mid-April issue), states that the Austrian electrical industry is looking forward to important orders in the near future, partly in connection with schemes for public productive investments and partly from Russia.

Islington Exhibition Scheme Rejected.

The Lighting Committee recently submitted to the Islington Borough Council a proposal to hold an electrical exhibition at an estimated cost of £500. Mr. Gallichan, in opposing the motion, said that when it came to manufacturers advertising, the manufacturers should pay for it. If the Council wanted to increase its output of electricity it should abolish the guarantees required from consumers in the borough. The motion was lost, 20 voting for it and 25 against.

European v. American Meters.

In one of the last issues of the *Electrical World* to reach us (April 16th) Mr. R. H. Schofield, sales manager, Ferranti, Ltd., takes up the cudgels on behalf of meters not made in America. Earlier in the year our contemporary published an article entitled "Foreign and Domestic Meters Compared," the whole tone of which, says Mr. Schofield, was calculated to show that meters not made in America were so inferior that they were not worthy of serious consideration. We quote Mr. Schofield:—"This statement is not only contrary to the facts but is contrary to the figures of the tests as shown in the report itself. The following paragraph appears in italic type in the report: 'The committee on metering and service methods has not found any meter of European manufacture that performs as well as the American product and that can be bought f.o.b. any point in the United States for appreciably less than the domestic product.' The ambiguity of this paragraph is characteristic of the report generally. Careful reading of it discloses the following information: That European meters of a quality equal to American meters are much more expensive and that those meters which are available at a price equal to the American manufacturers' price are not good enough to use. The paragraph is so worded, however, as to indicate that the committee has not been able to find a European meter as good as the American ones. The plain facts are that European meters are available quite equal to those of domestic production, but owing to the tariff of 45 per cent., which is based upon the value of the meters in the country of origin, they are not available to the American user at an economical price. It would be misleading to your readers to assume that this condition applies in the rest of the world, where American meters are sold in competition with those of Europe in a ratio preponderantly in favour of European meters. There is no doubt that American-made meters have attained a very high standard of excellence, but it is equally true that European meters have of necessity attained a similar standard, and in reality the whole report could have been condensed into the following sentence: 'European meters of a class equal to American meters are not available to American users because of their landed cost being so much higher than that of the domestic product.'"

Platinum in the Transvaal.

Professor Kovaloff, the Russian platinum expert who has exhaustively investigated the Transvaal occurrences, has been appointed S.A. representative of the Berlin selling agency for the Russian product. He strongly urges that the establishment of a refinery in South Africa would provide the only hope of successful competition on the part of the local industry. Until recently the price of platinum had for some time ruled in the neighbourhood of £25 per ounce. It had been expected that the increase in the supplies owing to the production from Transvaal sources would be followed by a fall in value.

Unemployment.

There was an increase of over 28,000 in the number of unemployed during the week ended April 19th. At that date the total was 1,106,400, as compared with 1,078,250 on April 12th, and 996,650 on April 20th, 1926.

The Union Cable Works.

It is stated in German circles that the German Cable Works Company, of Berlin, is in negotiation for the re-acquisition of the factory at Dagenham.

Electrical Treatment at Torquay.

In a handsome official handbook of Torquay, which has been received from the authorities of that town, particulars are given of a very complete electro-medical service which is available to visitors. The modes of treatment include galvanism, faradism, sinusoidal currents, diathermy, high-frequency, combined heat and light baths, ultra-violet rays, Dowsing radiant heat, &c.

Battery Works Strike.

About 200 employés of the Sparkhill battery works of Messrs. J. Lucas struck work last week as a protest against a proposed reduction in the rates of pay. They returned upon the following day, the management having agreed to make a smaller reduction.

New Municipal Showrooms and Offices.

Morecambe Corporation Electricity Committee has asked the borough engineer to prepare a scheme for the provision of a showroom and offices for the electricity department.

Local Exhibitions.

STEPNEY.—An electrical exhibition, held under the auspices of the Borough Council Electricity Department (engineer and manager, Mr. W. C. P. Tapper), was inaugurated by the Mayor on April 29th, and continues until May 7th. The Council's stand serves as an inquiry bureau where information is given to visitors of the favourable terms of electricity supply, &c. The exhibition occupies two halls and a large variety of excellently displayed electrical domestic and other appliances are to be seen on the other stands, which total 30 in all. In the Winter Garden, the E.L.M.A. stand takes the form of a model shop window showing modern lighting methods; Messrs. Barrons (Leicester), Ltd., are displaying bakery machinery and butchers' meat-chopping machines; Automatic and Electric Furnaces, Ltd., exhibit electric annealing and steel-hardening apparatus; Messrs. Sager & Co. are demonstrating woodworking machinery; Messrs. Sadia, Ltd., are showing geysers and water heating apparatus; the Rowing Engineering Co. is displaying bakery machinery; and Messrs. George Nobbs, Ltd., exhibit electric water heaters and geysers. In the Queen's Hall, the stands are almost entirely devoted to the display of domestic apparatus. An extensive range of electric cookers, heaters, and general domestic apparatus is exhibited by the British Electric Transformer Co., Ltd., Hotpoint Electrical Appliance Co., Ltd., Cable Accessories Co., Ltd., Belling & Co., Metro-Vick Supplies, Ltd., Edison Swan Electric Co., Ltd., Berry's Electric, Ltd., Credenda Conduits Co., Ltd., and Jackson Electric Stove Co., Ltd. The British Thomson-Houston Co., Ltd., is making a special feature of its motors and wireless apparatus, and Messrs. John Bell & Croyden have an excellent display of Sunray and electro-medical apparatus. Motor-driven sewing machines are shown by the Singer Sewing Machine Co., Ltd., and Messrs. Wilcox & Gibbs. Lighting fittings and glassware are exhibited by the Wholesale Fittings Co., and Messrs. Hailwood & Ackroyd. In addition to its "Magnet" domestic appliances the General Electric Co., Ltd., is displaying portable tools and industrial apparatus. Messrs. Benham & Sons, Ltd., are showing electro-vapour radiators, Messrs. Aublet Homer and Co. are exhibiting cloth cutters, press irons, &c., Frigidaire, Ltd., refrigerators, the K.F.M. Engineering Co., Ltd., electric signs, and the Hart Accumulator Co., Ltd., accumulators and charging apparatus. Views of the Corporation's and the Edison Swan Co.'s stands are reproduced herewith.

The Council has introduced an assisted wiring scheme to encourage the use of electricity, and a scheme is being prepared to double the present capacity of the plant in order to meet anticipated demands.

Valuable assistance in organising the exhibition was given by the British Electrical Development Association.

CLITHEROE.—The formal opening of a ten days' electrical exhibition took place on April 28th. The Corporation is introducing an assisted wiring scheme.

GLASGOW.—The Corporation is recommended by a Committee to hold a Housing and Health Exhibition in the Kelvin Hall from September 21st to October 15th, 1927, and a Bakers' and Grocers' Exhibition in January and February, 1928.

New Swiss Companies.

A company has lately been formed in Neuchatel, with the title "M.S.N." Société pour la Fabrication et la Vente d'Appareils Electriques et Mécaniques, to manufacture electrical material, including radio apparatus.

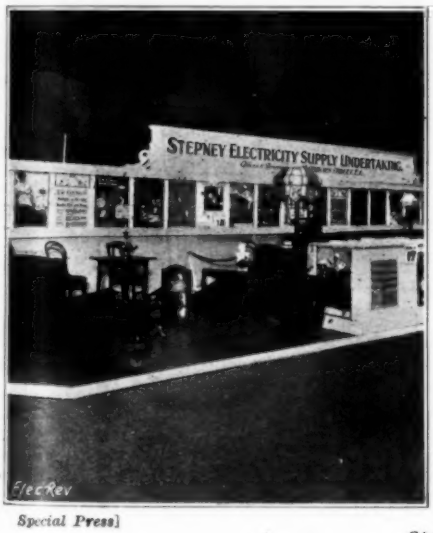
A new company has been formed in Aarau under the style of the "Maxim" Fabrik Gesellschaft für Thermo-Elektrische Apparate to acquire and carry on the business of Zurlinden and Fecht, makers of electric heating and cooking appliances.

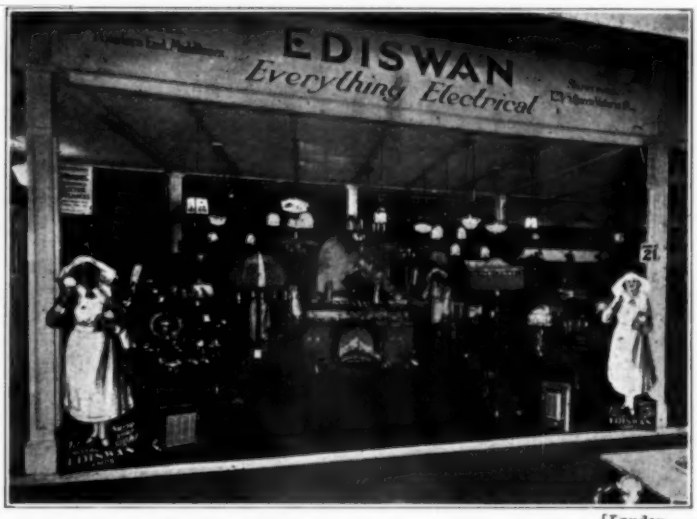
A new company has been formed at Kallnach, Canton of Berne, with the title Die Elektrochemische Werke Kallnach Gesellschaft, to acquire and carry on the Weinmann electro-chemical works in that town.

Proposed Whitley Councils Bill.

The National Joint Industrial Council for the Electricity Supply Industry was represented in a deputation from the Association of Joint Industrial Councils which attended the Ministry of Labour on April 26th in order to urge the necessity for legislation to give the joint industrial councils the same powers regarding enforcement of agreements, if and when such powers are requested, as are already possessed by trade boards and agricultural wages committees. The deputation was received by Mr. J. A. Barlow. It was emphasised that the Bill proposed by the Association did not impose powers on councils which did not seek them. An agreement would only become binding on a whole industry on application by the council concerned with that particular agreement. It was stated that 21 industrial councils and interim reconstruction committees supported the principle of the Bill; that eight which had supported it had ceased to exist largely through lack of the powers asked for; that a number of councils and committees were moribund owing to lack of powers; and that unless some legislative help was forthcoming the whole movement was in danger of collapse. The support of the Trade Union Congress and of the National Union of Manufacturers was also claimed for the principle of the Bill.

Mr. James Slevin stated that the Joint Industrial Council for the granite and roadstone quarrying industry in the South-West of England was holding together only in the hope of legislation. Employers who were loyal to their federation and who observed the agreements were suffering from grossly unfair competition. Peace in the furniture removal industry, it was stated by another speaker, was based on the hope of legislation. Mr. Bostock, ex-president of the Boot and Shoe Manufacturers' Association, stated that the only alternative to legislation was some sort of boycott of the offending employers or the withdrawal of labour by the unions. Mr. Barlow, who said that the Department had an open mind on the matter, promised to bring all that had been done to the notice of the Minister.





Special Press] [*London.*

Stands at the Stepney Exhibition.

The Department of Overseas Trade.

The Times reports that the Swansea Chamber of Commerce has passed a resolution that the Chamber, "while deeply anxious that reduced national expenditure should be brought about, feels that the Department of Overseas Trade is of considerable value to the commerce of this country, and desires to remind the Government of the repeated requests of British Chambers of Commerce over many years for a Ministry of Commerce, and therefore urges upon the Government the desirability of continuing the Department in its present form."

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Safety Lamps Order.

The Secretary for Mines on April 13th made an Order under Section 33 of the Coal Mines Act, 1911, approving for use in all mines to which the Act applies the following types of electric safety lamps, *viz.*:—

Beacon, Type B.
Derby Alkaline, Pillarless.
Derby Alkaline, Pillared.
Dominit, 2-volt.
Dominit, 4-volt.
Derby Bull's-Eye Type (for officials and for special purposes).
Wefco Hand Torch (for officials).

The Order also amends specifications of types of safety lamps (electric and flame) already approved.

New French Companies.

A company has been formed in Paris (10, Rue d'Uzes), with a capital of 18 million francs and the title La Société des Téléphones Grammont. The object of the new concern in which the Société des Etablissements Grammont of Paris, the General Electric Co., Ltd., London, and the Western Telephone Co., of Chicago, are reported to be interested, is to undertake part of the contract for the conversion of the telephone system in the Paris area to automatic operation.

La Société Central Lumière Province is the name of a company which has lately been formed in Paris (9, Place de la Bourse), with a capital of 500,000 fr., to establish electricity supply undertakings in the Vendée Department.

Trade Announcements.

The MULLARD WIRELESS SERVICE CO., LTD., has opened a new depôt at 13, Deansgate, Manchester. The depôt will carry large stocks, and is under the management of Mr. Y. W. P. Evans.

The address of the HALIFAX & BERMUDAS CABLE CO., LTD., and the DIRECT WEST INDIA CABLE CO., LTD., is now Spencer House, 4, South Place, E.C.2. Telephone: London Wall 9802; telegrams: "Quiescent, Ave, London."

MR. MAURICE BOBIN, 21, Warwick Lane, E.C.4, is shortly opening offices in Paris, and will be pleased to hear from British manufacturers wishing to be represented in France.

On and after May 9th the address of OLIVER PELL CONTROL, LTD., and TOK SWITCHES, LTD., will be Kingsway House, 103, Kingsway, W.C.2. (Telephone: Holborn 5303.)

MR. J. E. DAWSON, radio engineer, has opened new showroom premises at the corner of High Street, Boston.

MESSRS. CURRY'S, LTD., dealers in wireless and electrical goods, have opened a new branch business at 61, Hallgate, Doncaster.

MR. W. W. HITCHING, who, as announced in the ELECTRICAL REVIEW for February 25th, 1927, p. 299, purchased the business of Brittain's Electric Motor Co., Eastdown Works, Dermody Road, Lewisham, S.E.13, of which he had been general manager for many years, asks the trade to take note that a new company styled as Brittain's Electric Motor Co., Ltd., ELEC. REV., December 3rd, 1926, p. 925, is not in any way connected with his firm, and cannot supply the original Langdon-Davies or Brittain motors, or their spares or replacements.

POWER CONTRACTS, LTD., has opened offices at 78, King Street, Manchester, where Mr. J. Ditchfield, late sales manager to Messrs. E. Brook, Ltd., is in charge of sales and Mr. F. Bertwhistle in charge of estimating. Manufacturers' catalogues are asked for.

ELECTRIC ART SHADES, Feering Factory, Kelvedon, Essex, are opening a showroom under the supervision of Mr. G. York, late of the electrical department of Messrs. Harrods, Ltd., on May 16th, at Roxburghe House, Regent Street, W.1. (Tel.: Ambassador 9667.) Mr. K. G. GOULD, late of Messrs. Newmans, Ltd., has been appointed representative for the Midlands and Northern Counties, and Mr. R. T. HUNT has been appointed representative for the East and South-East Coast.

MESSRS. PRITCHETT & GOLD AND E.P.S. CO., LTD. (with which is incorporated Messrs. Peto & Radford), have appointed Mr. F. H. Durrant as their district representative for Northants, Beds., Berks., Bucks., Herts., and Oxfordshire.

New Catalogues and Lists.

BRITISH INSULATED CABLES, LTD., Prescot, Lancs.—Catalogue H.107—Mining Cables and Accessories, containing illustrated particulars of v.b., rubber, and paper-insulated cables, cable boxes, jointing materials, cable racks, insulators, wood poles, condensers for p.f. improvement, &c. Also an illustrated brochure (P.210) describing "Prescot" paper pinions.

DIXONIA, LTD., 4, Portsmouth Street, Kingsway, W.C.2.—A priced and illustrated list of lighting fittings, switches, and other automobile accessories.

The RAWLPLUG CO., LTD., Rawlplug House, Cromwell Road, S.W.7.—An illustrated booklet dealing with the many uses of "Rawlplugs" and methods of fitting them, and a leaflet containing particulars of the company's competition for builders, electricians, and others.

MESSRS. DAVIDSON & CO., LTD., Sirocco Engineering Works, Belfast.—An illustrated brochure detailing the achievements of a number of installations of the company's patent flue dust collectors.

The BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, W.C.2.—A folder containing illustrations and prices of electric lighting pendants of many designs, and hall lanterns.

IMPORTERS & DISTRIBUTORS, LTD., 173-175, Great Portland Street, W.1.—An illustrated price list of electric lamps.

Mr. FRED J. DOWN, 90-93, Fenchurch Street, E.C.3.—Illustrated and priced pamphlets describing the "Scrulix" and "Harpoon" guy anchors for staying poles, steel chimneys, &c.

AUTO-BULBS, LTD., Sphinx House, Hatton Garden, E.C.1.—A price list of "Sphinx" electric lamps for house lighting.

W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Holborn Viaduct, E.C.1.—Leaflet No. 298, dealing with the company's c.t.s. trailing cables.

MESSRS. A. C. COSSOR, LTD., Highbury Grove, N.5.—An illustrated and priced folder dealing with the company's automobile lamps; arranged for overprinting.

MR. W. H. AGAR, 19, Whitecross Place, E.C.2.—A priced and illustrated list of oak and mahogany cabinets for Mullard receiving sets.

VAC-TRIC, LTD., 12-13, Henrietta Street, W.C.2.—A priced and illustrated pamphlet dealing with the "Vac-Tric" suction cleaner.

MESSRS. H. E. ASHDOWN (BIRMINGHAM), LTD., Perry Barr, Birmingham.—A mailing card describing the "Ashdown" shockproof lampholder.

HART ACCUMULATOR CO., LTD., Marshgate Lane, Stratford, E.15.—A pictorial showcard advertising "Hart" motor starting and lighting batteries. Also a calendar-blotter for May.

POPE'S ELECTRIC LAMP CO., LTD., 5, Arthur Street, New Oxford Street, W.C.2.—May calendar-blotter advertising the company's lamps.

THE UNITED ELECTRIC CO. (BIRMINGHAM), LTD., Coolex Works, Caroline Street, Birmingham.—An illustrated price list of "Coolex" fuse units, ironclad fuses, and distribution boards.

The RADIO COMMUNICATION CO., LTD., 34-35, Norfolk Street, W.C.2.—List R/427, describing, with illustrations, a long-range receiver, Type R.29, designed for the reception of signals from the Rugby high-power station.

Bankruptcy Proceedings.

C. P. MOODY (trading as the South-Eastern Manufacturing Co.), Crown Works, Finck Street, Lambeth, S.E.—The public examination of this debtor was held on April 29th at the London Bankruptcy Court, the accounts showing total liabilities of £773 (unsecured £716), and net assets valued at £140. In reply to Mr. Allcorn, Official Receiver, the debtor stated that in March, 1920, he commenced business as a battery maker under the above style; the trading was successful for a time, but subsequently declined owing to competition. In March, 1924, he discontinued making batteries, and had since dealt in lamp shades. Witness attributed his failure to keen competition and to depression in the lamp-shade business owing to change of fashion. The examination was concluded.

HARRIETT SPENCER, trading as Spencer & Son, 30, Watergate, Grantham, Lincs., wireless and cycle dealer.—The first meeting of creditors was held on April 22nd, at the Official Receiver's offices, Nottingham. The statement of affairs showed ranking liabilities of £349 and a deficiency of £323. Debtor attributed her failure to taking over the liabilities on the purchase of an insolvent business. She stated that the concern had belonged to a relative, and she and her husband had for some time assisted in the management. Debtor only admitted knowledge of her position a few days before the date of the receiving order, when the writ was served. The matter was left with the Official Receiver as trustee of the estate.

E. TEMPLE and JANE E. BURKETT, trading as "The Westoe Electrical Company, 105, Canterbury Street, South Shields, wireless dealers and electrical contractors.—The first meeting of the creditors of the above was held recently at the Official Receiver's office, Newcastle-on-Tyne. The statement of affairs showed liabilities of £950, against assets of £331. The creditors resolved to appoint Mr. A. J. Gray, accountant, of 48, Pilgrim Street, Newcastle, as trustee of the estate.

J. ATKINS (Atkins & Co.), electrical engineer, 59, Church Street, Tewkesbury, Electricity Works, Northleach, Glos., and at High Street, Winchcombe.—Receiving order made April 21st, on debtor's own petition. First meeting and public examination, May 12th, at the Court House, Cheltenham.

A. A. SMETHURST (A. Smethurst & Co.), electrical engineer, 62, Bernard Street, Southampton.—Receiving order made April 20th, on debtor's own petition.

P. FORD, electrical contractor, 4a, Macdonald Lane, Corporation Street, Manchester.—First meeting held May 4th, at the Official Receiver's offices, Byrom Street, Manchester. Public examination, May 27th, at the Court House, Manchester.

T. A. WICKHAM, electrical engineer, Snaresbrook, Station Road, New Milton, Southampton.—Trustee, Mr. H. Ashton, Official Receiver, Midland Bank Chambers, High Street, Southampton, released April 8th.

W. K. COXON (separate estate), trading together with E. R. Weare as the Western Mfg. Co.), electrical engineer, Nurshill, Lydney, Glos.—Last day for proofs for dividend, May 11th. Trustee, Mr. C. Latham, 78, New Oxford Street, W.C.

A. E. S. CHALLENER, wireless engineer, 277, St. Sepulchre Gate, Doncaster.—First and final dividend of 1s. 8d. in the £, payable at the Official Receiver's offices, 14, Figtree Lane, Sheffield.

H. NUTTER, electrical engineer, 246, Yorkshire Street, Rochdale.—Receiving order made April 25th, on debtor's own petition.

A. H. DUFFIN and G. KERSHAW (A. H. Duffin & Co.), electrical engineers and contractors, Provincial Buildings, Conway Road, Colwyn Bay.—Last day for proofs for dividend, May 11th. Trustee, Mr. I. D. Hooson, Official Receiver, St. Peter's Churchyard, The Cross, Chester.

E. TEMPLE and J. E. BURKETT (Westoe Electrical Co.), wireless dealers and electrical contractors, 105, Canterbury Street, South Shields.—Trustee, Mr. A. J. Grant, 48, Pilgrim Street, Newcastle-on-Tyne, appointed April 26th.

J. TURNER, electrician, 62, Blackburn Road, Great Harwood.—Receiving order made April 26th, on debtor's own petition.

L. BELL (C. Bell), mechanical and electrical engineer, Joseph Street, Leeds Road, Bradford.—Receiving order made April 25th, on debtor's own petition. First meeting to be held May 6th, at the Official Receiver's offices, 12, Duke Street, Bradford. Public examination, May 24th, at the County Court, Bradford.

Company Liquidations.

RADI-ARC ELECTRICAL CO., LTD., Bennett Street, Chiswick, W.—A meeting of creditors was held on April 27th, at the Institute of Chartered Accountants, E.C., when a statement of affairs was presented which disclosed liabilities of £3,598, of which £1,222 was due to the trade, the bank was creditor for £736 in respect of an overdraft, and there were partly secured creditors for £1,750, holding security valued at £100, leaving a balance of £1,650 to rank as unsecured. The net assets were £1,235, leaving a deficiency of £2,363. The liquidator, Mr. Ernest James, St. Lawrence House, Trump Street, E.C., said that the bank was guaranteed by Mr. Blaiberg, the loan creditor. The company was incorporated in February, 1919, under a different name. The name was changed to the present style in 1922. The business was formed by Mr. Blaiberg's son, but for the past two years he had been unable to do any work in connection with the company, and it had been managed for him, and had been financed by his father. The share capital was £200, all of which was put up in cash. The loan had been paid in cash; nothing had been charged by way of interest and no directors' fees had been paid. The company did a considerable amount of experimental work during the early months of its trading, and did not commence dealing in wireless goods until February, 1924. The loss sustained through the experimental work was about £200. According to a profit and loss account for the period to November, 1924, there was a loss of £1,148. During the next year to November, 1925, there was a profit of £760, and the last completed accounts, to September 30th, 1926, showed a loss of £809. Mr. Blaiberg might have been prepared to carry on the business, but recently three of the creditors issued writs, and subsequently the necessary resolutions for voluntary liquidation were passed. Mr. James said that a gentleman who was interested in wireless had offered to take over the business and pay the creditors a composition of perhaps 6s. or 7s. in the £. Mr. James, however, was instructed to make no definite offer, and even if an offer of 6s. or 7s. in the £ were made he would not advise the creditors to accept it at the moment. Mr. P. Houstoun, of the British Traders' Association, proposed that Mr. James should be continued as liquidator, together with a committee of inspection consisting of three of the principal trade creditors. That resolution was carried. The following are creditors:—

	£		£
Art Publicity Service ...	92	Hurst, H., & Co.	30
London Metal Warehouses	55	Brandes, Ltd.	26
Marconi Co.	62	Rad Vaco, Ltd.	25
Portable Wireless Co. ...	55	Trader Publishing Co. ...	24
Radio Communication Co., Ltd.	35	Heywood, N.	23
Houghton-Butcher (Gt. Britain), Ltd.	35	Mullard Wireless Service Co., Ltd.	22
Tudor Wireless Co. ...	35	Stevens, J. R.	21
American Hard Rubber Co.	27	Electron, Ltd.	20
		Standard Telephones & Cables, Ltd.	20

NATIONAL WIRELESS CORPORATION, LTD., 14, Cursitor Street, Chancery Lane, W.C.—Under the compulsory liquidation of this company, Mr. E. T. A. Phillips, Official Receiver and liquidator, has issued his report in great detail. We have not space to print it here. The winding up order was made last December on a creditor's petition. Mr. Phillips reports, *inter alia*, that the company was incorporated as a private company on February 24th, 1925, with a nominal capital of £1,000, subsequently increased to £3,500, in shares of 1s. each, for the purpose of carrying on the business of radio and general engineers, manufacturers, merchants, &c. The directors appointed by the articles were W. Wrentmore and R. M. Reith. H. N. Westgate, Sir Alexander Spearman, Bt., and H. C. Cowan were subsequently appointed directors. At the date of the winding up Wrentmore was the sole director. The statement of affairs lodged on January 27th, 1927, shows assets valued at £322, including a debenture in Natwirco, Ltd., £250 and 50 ordinary shares in Burndept Wireless. Unsecured creditors are returned in the statement at £388. On March 2nd, 1927 (in view of the fact that the interest on the debenture issued to the corporation by Natwirco, Ltd., had not been paid and that that company had discontinued its business, the Senior Official Receiver appointed himself receiver of the property charged under the debenture, and has since sold it for under £30. As the debenture, which was estimated to produce £250, was the corporation's principal asset, there appears to be no prospect of a dividend for the unsecured creditors or shareholders. The failure of the corporation is attributed by Wrentmore to the competition of amateur wireless manufacturers and to insufficient capital with which to open the multiple shops as intended. Turner agrees with Wrentmore's second cause of failure, and adds as a further cause the large commission paid to Hills, of the British Fiduciaries, Ltd., for capital obtained by him.

ELECTRIC LIGHT & POWER CONTRACTS FINANCE CORPORATION, LTD.—A petition for the winding up of this company has been presented to the High Court by Messrs. H. Saunders, Ltd., 40-41, Great Charles Street, Birmingham, and will be heard in London on May 10th.

ROBINS WHOLESALE ELECTRICAL & WIRELESS CO., LTD.—A meeting of members is called for May 30th at 31, Queen Street, Cardiff, to hear an account of the winding up from the liquidator, Mr. S. E. Clutterbuck.

ELECTRICAL CABINET WORKS, LTD.—Last day for proofs for dividend, May 11th. Liquidator, Mr. H. E. Burgess, Senior Official Receiver, Carey Street, W.C.

Private Arrangements.

E. EDWARDS & Co., Great Eastern Street and High Street, Shoreditch, E., electrical and wireless factors.—A further meeting of creditors was held on April 29th, at the Institute of Chartered Accountants. The chair was occupied by Sir Harold Moore, 4, London Wall Avenue, E.C. The creditors were first called together in February, when the liabilities were stated at £28,867, against net assets of £17,564, and it was then intimated that bankruptcy proceedings would be instituted on behalf of a creditor. Sir Harold Moore stated that after the last meeting he was approached by a number of the larger creditors, and at their request a deed of assignment was executed to him on February 16th, and duly registered. There were difficulties in the way of an immediate realisation, and it was not at all certain when the deed was executed that the estate would not, within a very short time, be in the process of administration in bankruptcy. It was, however, desired to avoid that. He had carried on the business since his appointment, and reduced expenses. Certain of the preferential claims and the current expenses had also been discharged, and there was now cash at the bank to the extent of £4,074. There was still a substantial amount of stock in hand for realisation. At the moment there were two outstanding bankruptcy petitions. Resolutions were passed appointing a committee of five of the principal creditors to act with Sir Harold Moore in dealing with the estate under the deed of assignment; and asking the committee to take any steps necessary to oppose the bankruptcy petitions.

J. I. LLOYD, 36, Church Road, Ton Pentre, wireless dealer, &c.—The creditors were called together last week at Cardiff, when a statement of affairs was presented which showed liabilities of £495, all due to the trade. The net assets were £27, leaving a deficiency of £468. A resolution was passed agreeing to accept a composition of 3s. 4d. in the £, payable in two months and secured to the satisfaction of a committee consisting of the representatives of the South Wales Wireless Installation Co., Ltd., Messrs. Clarke, Dovey and Co., and Messrs. E. T. Collins & Son.

Book Notices.

"The *Electrician* Annual Tables of Electricity Undertakings, 1927." (Pp. vii+194). London: Benn Bros., Ltd. Price 10s. net.—An innovation in this, the 40th, edition is a complete index of the British undertakings dealt with in the tables. It is claimed that particulars are given of upwards of 800 British and 1,300 Colonial and foreign undertakings.

"Science Abstracts" (A. and B.). Vol. XXX. Part 4. April 25th, 1927. London: E. & F. N. Spon, Ltd. Price 3s. each, net.

"British Railway Operation." By T. B. Hare. Pp. 156. London: Modern Transport Publishing Co., Ltd. Price 3s. 6d., net.

"Working Model Railways; How to Build and Run Them." By J. Davidson. Pp. 64; figs. 63. London: Percival Marshall and Co. Price 9d.

"Electric Circuit Theory and Calculations." By W. P. Maycock. Third edition. Pp. xiv+355; figs. 120. London: Sir Isaac Pitman & Sons, Ltd. Price 10s. 6d., net.

Scientific Papers of the U.S.A. Bureau of Standards.—No. 543, "Linkage-current Diagram for Representing Magneto Operation" (20 cents). No. 544, "Effect of Eddy Currents in a Core consisting of Circular Wires" (10 cents). No. 545. "Determination of the Magnetic Induction in Sheet Steel." (10 cents.)

"Technologic Papers of the U.S.A. Bureau of Standards." Vol. 21, No. 335. "Thermal Expansion of Graphite." (5 cents.)

"Quarterly Bulletin of the British Cast-Iron Research Association." No. 16, April, 1924.

"Dielectric Phenomena," by S. Whitehead. Pp. 176+42 figs. London: Ernest Benn, Ltd. Price 16s. net.

"Transformateurs de Puissance," by M. Mathieu. Pp. 305; figs. 82. Paris: A. Blanchard. Price 18 fr.

Messrs. Crosby Lockwood & Son will shortly publish "The Timber Trade of the United Kingdom," by Mr. Thomas J. Stobart; two volumes, 5s. each net.

The British Broadcasting Corporation has issued a 24-page booklet, illustrated with portraits of some of the lecturers, containing full details of the series of talks, lectures, and religious services that are to be broadcast simultaneously from all stations from May to July, inclusive.

Recent Contract.

The consulting engineers for the Ross-shire Electric Supply Co., Ltd., Messrs. Murdoch, Macdonald & Partners, have placed the contract for the supply and erection of the pipes, water turbines, and electrical plant required for the station at the outlet of Loch Luichart, with Messrs. James Gordon and Co., Ltd. The plant as at present designed covers the installation of two 750-h.p. Francis turbines working under a head of 110 ft. and running at 600 r.p.m. coupled to two 500-kW generators, together with switchgear, transformers, &c., and some 40 miles of transmission lines. The whole plant will be manufactured in Great Britain under the stipulations of the Trades Facilities Acts.

Callender's Hockey Champions.

The accompanying picture shows Callender's Ladies' Hockey Team which has secured the London Business Houses Cup by

Callender's Ladies' Hockey Team.

defeating the Railway Clearing House ladies' team in the final round of the competition.

Electric Power in Industry.

Further trades are dealt with in Preliminary Report No. 9 upon the 1924 Census of Production published with the *Board of Trade Journal* for April 28th. The hosiery trade reported an increase in the installed generating plant from 827 kW in 1907 to 1,495 kW in 1912, and 3,661 kW in 1924. Motors aggregating 2,763 h.p. were driven by internally produced power, while electricity for a further 13,911 h.p. was purchased. In the glove-making industry only 10 kW of generating plant was in use in 1907; in 1924 the total was 370 kW. The electric motors in use totalled 665 h.p. (power for 478 h.p. purchased). The generating plant installed in the musical instrument trades was 304 kW in 1907, 2,369 kW in 1912, and 3,137 kW in 1924. The motor capacity was 14,644 h.p. (power for 8,740 h.p. purchased). The needle, pin, fish-hook and button trades reported 200 kW of generating plant in 1907, 307 kW in 1912, and 489 kW in 1924. There were 4,047 h.p. of electric motors, power for 3,609 h.p. of which was purchased.

Schools of Salesmanship.

The National Union of Commercial Travellers is making an investigation into the effect of Schools of Salesmanship upon the status of commercial travellers, and Mr. C. J. Kebbell, the honorary secretary (42, Blackfriars Road, London, S.E.1), asks any of our readers who have been in touch with such schools to send him particulars of their experiences. It is desired to make the inquiry an impartial one and views, favourable or otherwise, are invited.

For Sale.

Crowborough District Gas and Electricity Co. invites offers for one Taylor Scotson voltage regulator, with switch panel. Redheugh Colliery, Ltd., has for disposal one electric winder, complete with 255-h.p. Siemens motor and switchgear, electrically-driven main and tail haulers, air compressor, transformers, switchgear, &c. Whitley U.D.C. Electricity Department has for disposal one 100-kW Parsons turbo-alternator, with spare armature. Severalls Mental Hospital, Colchester, has for disposal one 75-b.h.p. semi-Diesel oil engine, complete with spares. Mr. J. H. Shaw will sell by auction on May 11th, at 13, High Holborn, W.C., trade stocks of wireless and electrical goods, &c. (See our advertisement pages to-day.)

Indian Companies.

The Aligarh Electric Supply Co. has been formed for the purpose of supplying electricity to the town of Aligarh, which has a population of 70,000. The capital of the company is Rs. 10 lakhs. The Punjab Government has recently given a licence to the Eastern Engineering and Commercial Co., Ltd., for the supply of electrical power to the town of Meerut.—*Reuter's Trade Service* (Bombay).

Prices of Raw Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, &c.		Price May 3rd.	Fortnight's inc. or dec.
a	Acid, Oxalic	per lb.	8½d.	...
a	Ammoniac, Sal	per ton.	£60	...
a	Ammonia, Muriate (large crystal)	,,	£52	...
a	Bisulphide of Carbon	,,	...	...
a	Borax	,,	£25	...
a	Copper Sulphate	,,	£25 10s.	...
a	Potash, Chlorate	per lb.	4d. to 4½d.	...
a	,, Perchlorate	,,	8½d.	...
a	Shellac	per cwt.	£13 10s.	...
a	Sulphur, Commercial	,,	£9 10s.	...
a	,, Roll	,,	£9 10s.	...
a	Soda, Chlorate	per lb.	3½d to 3¾d.	...
a	,, Crystals	per ton.	£5 to £5 5s.	...
a	Sodium Bichromate, casks ...	per lb.	4d.	...
	METALS, &c.			
b	Aluminium, Ingots...	per ton.	£107 to £112	...
b	,, Wire	per lb.	1/6 to 2/-	...
b	,, Sheet	,,	1/9 to 2/9	...
p	Babbitt's Metal and Anti-friction Metal—			
	Grade I	per ton net.	£261	£11 dec.
	Grade II	,, ,,	£182	£7 dec.
	Grade III...	,, ,,	£94	£3 dec.
c	Brass (rolled metal 2" to 12" basis)	per lb.	9¼d.	...
c	,, Tubes (solid drawn) ...	,,	11½d. to 11¾d.	...
c	,, Wire, basis	,,	9¾d.	...
c	Copper Tubes (solid drawn) ...	,,	1/0½	...
c	,, Bars (best selected) ...	per ton.	£86	...
c	,, Sheet	,,	£86	...
c	,, Rod	,,	£86	...
d	,, (Electrolytic) Bars ...	,,	£61 10s.	30/- dec.
d	,, ,, Sheets ...	,,	£146 10s.	...
d	,, ,, Wire Rods ...	,,	£71 10s.	30/- dec.
d	,, ,, H.C. Wire	per lb.	9⅞d.	¼d. dec.
f	Ebonite Rod	,,	2/3 to 2/6	...
f	,, Sheet	,,	2/3 to 2/6	...
a	German Silver Wire	,,	2/2	...
h	Gutta-percha, fine	,,	8/-	...
h	India-rubber, Para fine	,,	1/5	¼d. dec.
i	Iron Pig (Cleveland No. 3.) ...	per ton.	122/6	...
i	,, Wire, galv. No. 8, P.O. qual.	,,	£21	...
g	Lead, English pig	,,	£27 5s.	20/- dec.
g	Mercury	per bot.	£22 15s. to £23	...
e	Mica (in original cases) small ...	per lb.	3d. to 3/-	...
e	,, ,, medium	,,	4/- to 8/-	...
e	,, ,, large ...	,,	10/ to 20/- & up.	...
p	Phosphor Bronze, plain castings	,,	1/3½	...
p	,, ,, drawn bars & rods	,,	1/3	...
p	,, ,, rolled strip & sheet	,,	1/2½	...
p	,, ,, wire...	,,	1/3½	...
e	Platinum	per oz.	£33	...
d	Silicium Bronze Wire	per lb.	10½d.	½d. dec
r	Steel, Magnet, in bars	,,	7¼d.	...
n	Tin, Block (English)	per ton.	£294 to £295	£9 dec.
n	,, Wire, Nos. 1 to 16	per lb.	4/9	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

Reporting on April 30th, Messrs. James Forster & Co. stated:—"Closing prices for lead yesterday were £25 11s. 3d. for April, and £26 1s. 3d. for July, or about 10s. a ton lower on the week. . . . A little more interest has been shown this week by home consumers, though this does not apply to the cable trade, where makers are anxiously awaiting Post Office orders to keep their works employed. Arrivals, on the other hand, are still on the heavy side, and stocks have probably been increased this month to a small extent. Conditions on the Continent are steadily improving, and the weakness in the position has now shifted from there to America."

Lighting and Power Notes.

Ayrshire.—Special Order.—The Electricity Commissioners have made a Special Order authorising the Ayrshire Electricity Board to supply electricity for public and private purposes within the burghs of Girvan, Maybole, and Largs.

Barrow.—Extension Scheme Sanctioned.—The *Manchester Guardian* reports that, following upon the persistence of the Corporation's Electricity Committee, the Electricity Commissioners have sanctioned the extensions to the electricity works at a cost of £60,000. Originally this proposal was rejected, the suggestion being made that arrangements should be made with Messrs. Vickers for additional supply.

Bedford.—Loan.—The Corporation Electricity Committee is applying for sanction to a loan of £10,000 for services.

New Sub-Station.—The Committee is to erect a sub-station at Sandy.

Blackburn.—INQUIRY.—Criticisms of the Corporation Electricity Department in Blackburn are stated to be unjustified, but to reassure the public it has been decided to hold an inquiry into the general administration. The Town Clerk (Sir Lewis Beard) will be asked to name experts who may be selected to conduct the inquiry, the holding of which has met with the approval of the borough electrical engineer.

Bridlington.—ELECTRICITY SUPPLY.—The Corporation Electricity Committee has received a letter from the Electricity Commissioners stating that the question of extensions to the electricity works has been deferred in order that the question of the future of the Scarborough and Hull electricity undertakings may be generally considered as affecting the three centres. The Commissioners suggest that the Council should consider the advisability of collaborating with the Scarborough Corporation in order to examine the possibilities of either the joint purchase of electricity in bulk, or, alternatively, the erection of a joint station. The Committee's views in the matter are invited, and it proposes to ask Mr. S. B. Donkin, consulting engineer, to confer with the consulting engineer of Scarborough, the electrical engineer of the Hull Corporation, and the Electricity Commissioners, as to the advisability of both Scarborough and Bridlington taking a bulk supply from Hull, or the erection of a joint station for Bridlington and Scarborough, and to report to the Council.

Cardiff.—ASSISTED WIRING SCHEME.—The borough electrical engineer (Mr. Morley New) has submitted a report to the Electricity Committee on the proposed assisted wiring scheme. The installation costs would be £8 7s. 1d. for five points, £9 6s. 4d. for six points, and £10 5s. 6d. for seven points. The proposed charge for electricity is 8d. per kWh until the cost of installation has been met. The Committee has adopted the report which has been passed on to the Finance Committee for approval.

Carlisle.—INAUGURATION OF POWER STATION.—The new electricity works will be formally inaugurated by the Mayor on May 26th, and the first set will set put in motion by the chairman of the Electricity Committee. Sir John Snell will be the chief guest at the subsequent luncheon.

Continental.—BELGIUM.—In order to meet the increasing demand for electricity, considerable extensions are in hand at the central power station in Brussels of the Société Bruxelloise d'Electricité. The number of boilers is being increased to 18, and a new 6,000-kW steam turbo-generator is being installed which will bring the capacity of the plant up to 33,000 kW.

SWITZERLAND.—Our Swiss correspondent states that at the last board meeting of the Vaudois company "Forces Motrices des Lacs de Joux et de l'Orbe" some important decisions were arrived at, whereby the company henceforward will be linked up with the lines of the power-houses belonging to the "Energie-Ouest-Suisse," the connection being made at Romanel. The result of this arrangement will be that the surplus energy of the Peuffaire at Bex (due, under contract, to the "Forces Motrices des Lacs de Joux et de l'Orbe") will be distributed to the power stations of Ch. Bertolus, at Bellegarde, over the high-pressure lines of Romanel to Geneva, belonging to the E.O.S. Company.

The Energie-Ouest-Suisse Company has now resolved to construct a high-pressure line between the Chèvres powerhouse at Geneva and the French-Swiss frontier. There will be a measuring station at Chèvres, a relaying station at Romanel, a high-pressure line from Vernayez to Romanel, together with a transforming station at the latter; the E.O.S. will also finish the works at Champsec in the valley de Bagnes, as well as the high-pressure line from Champsec to Martigny, which will entail a cost of some ten million francs (Swiss).

POLAND.—La Société Centrale Electrique du Bassin de Cracovie, which is supplying electricity in the Cracow district, is increasing the capacity of its generating plant from 10,000 to 22,000 kW. The Société Centrale Electrique de Pruskow, which supplies electricity to the town of Pruskow and the industrial suburbs of Warsaw, is also increasing the capacity of its plant from 8,500 kW to 18,500 kW. A contract has recently been secured by this concern to supply the power required for the Warsaw-Grodzisk section (20 miles) of the Société Chemins de Fers Electriques Suburbains.

Eastbourne.—ELECTRICITY EXTENSIONS.—At a recent meeting of the Electricity Committee the proposed extension of area of supply was considered, and the town clerk was instructed to proceed with the application for the proposed Special Order and to oppose the applications for Special Orders which have been lodged by various companies to enable them to supply electricity in districts which it is proposed to include in the Eastbourne area.

Glasgow.—PROGRESS DURING MARCH.—Under the Corporation Electricity Committee's assisted wiring scheme 126 houses were wired in March, bringing the total to date to 3,478. The agreements during March under the ten years' hire-purchase scheme numbered 176, bringing the total up to 248. The hire of appliances in March numbered 174, making the total to date 14,749.

Guildford.—ELECTRICITY IN BULK.—At a recent meeting of the Corporation Electricity Committee the borough electrical engineer submitted correspondence with the borough electrical engineer, Aldershot, inquiring upon what terms the Corporation would be willing to give the borough of Aldershot a supply of electricity in bulk, and by what date the supply would be available. The Corporation replied that it would be in a position to submit terms and conditions for a bulk supply at an early date.

Hornsey.—LOAN SANCTIONED.—The Corporation Electricity Committee has received sanction to a loan of £6,500 for mains and switchgear.

India. — PUNJAB HYDRO-ELECTRIC SCHEME. — Considerable progress is reported with regard to the hydro-electric scheme on the Uhl River in the Mandi State in the Punjab. This scheme will supply electricity to the whole of the Punjab and is expected to cost about Rs. 8 crores. All preliminary work is now nearly complete. As the construction plant necessary for a scheme of this size involves a large and continuous demand for power, it was decided to erect a small water plant, and this of 960-kW installed capacity, under a 700-ft. head, is nearing completion. The power will be generated at 3,300 V a.c., and transmitted to the works area at 11,500 V. A system of electrically-operated cable haulage-ways up the hill side is being laid with connecting tramways at the crest and junction points. It is expected that the local power supply will be available, the tunnel drilling plant erected, and the driving of the tunnel commenced by July or August. As far as the transmission system is concerned, the survey of the trunk line from the power station in Mandi down to Pathankot has been nearly completed, and similar work has been started for the rest of the system.

Irish Free State.—PEMBROKE (DUBLIN).—On April 28th, the chairman of the Electric Lighting Committee formally started the new 840-b.h.p. Diesel engine which has been installed at the Urban District Council's electricity works at a cost of £12,000.

Japan.—NEW POWER STATION.—It is reported that the South Manchurian Railway authorities have under consideration the erection of a power station at Dairen with a capacity of from 30,000 to 40,000 kW.

Llandudno.—ELECTRICITY CHARGES.—The Electricity Committee of the Urban District Council has discussed the question of the price charged for electricity supplied to the Llandudno and Colwyn Bay Electric Railway, Ltd., and has decided to offer the company a reduction of 1/10d. per kWh in the present rate, to take effect from July 1st.

London.—BATTERSEA.—A Joint Committee of the Borough Council, reporting upon the application made by the London Power Co., Ltd., to the Electricity Commissioners for sanction to erect a generating station at Nine Elms, states that the three principal matters which arise are: (1) The liability to nuisance from smoke and coal dust; (2) the possibility of the company sinking wells and diminishing the well-water supply at Nine Elms baths; and (3) the already congested condition of Nine Elms Lane and Battersea Park Road so far as underground mains are concerned. The Committee has approved an agreement with the company giving the Council protection on the three points mentioned. The Committee states that the London County Council, the Westminster City Council, and the Great Western Railway are each dealing with the application so far as their respective interests are involved.

ST. MARYLEBONE.—The Borough Council has been notified that the terms of agreement with the Hampstead Borough Council for bulk supplies of electricity have now been approved by the Electricity Commissioners and the London and Home Counties Joint Electricity Authority.

Application is to be made for sanction to a loan of £27,338 to cover excess expenditure on the Council's plant extension scheme.

Lowestoft.—LOAN.—The Corporation Electricity Committee has received a report from the electrical engineer as to the plant required in connection with the taking of a bulk supply of electricity from Gt. Yarmouth Corporation, and recommends that application be made for sanction to a loan of £30,000, made up as follows:—22,000-V switchgear, £5,500; transformers, £3,000; 6,600-V switchgear, £2,700; converting plant and switchgear, £13,800; d.c. feeder panels, £1,000; alterations to main cables, £400; foundations and alterations to buildings, £3,000; contingencies, £600.

EAST ANGLIAN BILL.—The Corporation Electricity Committee reports that the promoters of the East Anglian Electricity Bill have now omitted the whole of the County of Essex from the Bill, and have agreed to insert therein certain clauses for the protection of authorities who are also authorised to supply electricity in the remaining part of their proposed area. The Corporations of Great Yarmouth, Norwich, and Ipswich have submitted additional clauses intended to exclude the promoters from supplying electricity in areas for which the Corporations hope to obtain powers to supply electricity in future, and to exclude from the scope of the Act the right of the promoters to have the powers of the Central Board delegated to them under the Electricity Supply Act, 1926. These further clauses have not been accepted by the promoters. The Committee is of opinion that so far as the interests of Lowestoft are concerned, the clauses which the company is prepared to insert may be accepted as a fair compromise, and it has accordingly authorised the withdrawal of the Council's opposition to the Bill.

Manchester.—LOAN.—The Corporation Electricity Committee is applying for sanction to the borrowing of £252,500 for services.

Morecambe.—SUPPLY FOR HOUSING ESTATE.—The Corporation Electricity Committee is to supply electricity to the South Grove housing estate at a cost of £1,500 for mains and services.

RAILWAY SUPPLY.—At an Electricity Committee meeting the borough electrical engineer reported correspondence with the railway company with respect to the supply of electricity for the working of its railway between Heysham, Morecambe, and Lancaster. The chairman and electrical engineer have been appointed to enter into an agreement with the railway company for this purpose.

Plymouth.—ELECTRICITY EXTENSIONS.—Cable extensions, at an estimated cost of £3,268, to a site at St. Budeaux upon which houses are to be erected for Admiralty employés, were authorised by the Electricity Committee on April 26th. The linking up of the cable at Saltash Passage and extensions to ten further streets were also sanctioned.

Portsmouth.—ELECTRICITY EXTENSION.—In connection with the proposed bulk supply of electricity to Midhurst, the Corporation Electricity Committee has received an application from the Chichester Corporation that a h.p. cable be laid by the Council from the Fishbourne sub-station to Sennicotts Corner, on the understanding that the Chichester Corporation will pay half of the sinking fund and interest charges on the cost until such time as the cable is continued to Midhurst, and that the 10 per cent. abatement in respect of the Summersdale area on the unit charge will be waived for two years if this is done. As the cable in question forms the first part of the proposed extension to Midhurst, the Committee recommends that the request be complied with, and that a h.p. cable be laid from the Fishbourne station to Sennicotts Corner accordingly.

LOAN SANCTIONED.—The Committee has received sanction to a loan of £1,693 for the erection of a sub-station in Crown Street.

Prestatyn.—LOAN.—The Urban District Council is to borrow an additional £5,000 for electricity extensions. It is anticipated that the Council will be in a position to take electricity from the North Wales Power Co., Ltd., in the course of a few days.

Preston.—ASSISTED WIRING SCHEME.—The Electricity Committee has submitted a report on an assisted wiring scheme to the Council for approval. The report states that there are 70,000 houses in the borough not wired for electricity, which it is estimated would yield an additional revenue of £150,000 if electricity was installed. On the proposal "that the work in connection with the scheme be carried out by the Electricity Department by direct labour or by the employment of contractors," an amendment was moved that this clause be deleted. The chairman of the Electricity Committee stated that it was not prepared to commit itself to direct labour entirely until it had some proof that it was the best thing that the Department should carry out the work. On the vote being taken, the amendment was lost by 18 votes to 13.

Prestwich.—STREET LIGHTING.—The surveyor has submitted to the Urban District Council a comparative statement of the cost of converting the public lamps in the district from gas to electric lighting, and it has been decided to take no action in this connection, but to consider the relative merits of gas and electricity when the question of the provision of additional public lighting facilities is considered.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

EDINBURGH.—Lighting: From 4½d. to 3½d. per kWh. Power: From 1.6d. for the first 1,000 kWh per annum and 0.9d. for all energy above 31,000 kWh per annum to 1.4d. and 0.7d., respectively, with a discount of 6 per cent. for all energy over 31,000 kWh for 3-phase supply. Domestic heating: From 1.2d. per kWh for the first 100 kWh per term and 0.825d. beyond, to 1d. and 0.625d., respectively.

OSWESTRY.—Lighting: From 9½d. to 8d. per kWh.

BURY.—The increases of 10 per cent. for lighting, and 15 per cent. for power, made owing to the coal dispute, have been withdrawn.

MANCHESTER.—To all consumers, except those under special agreement: A reduction of ½d. per kWh.

Rothesay.—NEW POWER STATION.—The plant installed at the Town Council's new power station, which was recently inaugurated, includes a 5-cylinder 250 b.h.p. Mirrlees-Diesel engine, made by Messrs. Mirrlees, Bickerton & Day, Ltd., Stockport. The engine is direct-coupled to a 170-kW Metropolitan-Vickers generator. The consulting engineers for the scheme were Messrs. Stevenson & McGuffie, of Glasgow.

Special Orders.—Applications have been made to the Electricity Commissioners for Special Orders by the Spalding Urban District Council authorising it to supply electricity in the rural district of Crowland, and part of the rural district of Peterborough; the Llanelly and District Electric Supply Co., Ltd., to extend its area of electricity supply so as to include the borough of Kidwelly, and parts of the rural districts of Carmarthen, Llandilo Fawr, and Llanelly; and the Crowborough District Gas and Electricity Co., to supply in the parish of Rotherfield.

Stoke-on-Trent.—ALL-ELECTRIC HOUSES.—At a recent meeting of the Corporation Electricity Supply Committee it was reported that considerable public interest was being taken in the two all-electric houses in Avenue Road, Shelton, and that up to March 30th the number of people who had inspected the houses was estimated at 14,500. The Committee decided to ask the Housing Committee to erect a further 22 all-electric houses in Avenue Road, Hanley, and to allocate 200 houses on the Abbey Hulton housing site as all-electric houses to be wired for lighting, heating, and cooking by, and at the cost of, the Electricity Supply Committee.

Taunton.—LOAN.—The Town Council has applied for sanction to a loan of £1,500 for transformers and transformer sub-stations.

Whitburn (Durham).—STREET LIGHTING.—The Parish Council has decided to adopt electric lighting for the streets of Whitburn and Marsden, and has accepted the tender of the Durham County Electrical Power Co., Ltd., for its installation and maintenance.

Tramway and Railway Notes.

Australia.—MELBOURNE.—The *Industrial Australian and Mining Standard* reports that the Melbourne and Metropolitan Tramways Board has been authorised to raise a further loan of £250,000. Mr. A. Cameron, chairman of the board, explained that the money would be used for tramway conversions and duplications, the construction of new cars and other tramway purposes.

Brighouse.—PURCHASE OF ROUTE.—Negotiations between the Halifax and Bradford Corporations have resulted in the former offering to sell to Bradford the running rights of its tramway from Brighouse to Bailiff Bridge (a little over a mile in length, and joining up with the Bradford system) for £5,000. The Bradford Tramways Committee, on April 27th, decided to recommend the City Council to accept the offer, thus giving Bradford a tramway service through to Brighouse. The Halifax lines are only 3 ft. 6 in. gauge, and if the purchase is made it is likely that the permanent way will be widened to the gauge of the Bradford track, which is 4 ft.

Burnley.—PURCHASE OF CARS DEFERRED.—The General Purposes Committee has decided to defer consideration of the purchase of five double-deck tramcars until the end of September. It is stated that the Corporation owns 53 double-deck cars and 19 single-deck cars. No additional double-deck cars have been purchased since September, 1912. The passengers carried increased from 16 millions in 1913 to 24 millions in 1926. In the opinion of the Tramways Committee it is necessary to increase the rolling stock to enable the Department to deal with the demands of increasing traffic. The cost of the new cars is £9,800, which the Department proposes to meet out of revenue, spread over five years.

Continental.—HUNGARY.—The Chamber of Commerce of Miskolcz has submitted to the Hungarian Minister of Commerce a detailed plan for electrifying the Miskolcz-Bánréve railway, Hungary's most important communication with Czecho-Slovakia. It is proposed to erect a power station near the mines of the Sajo Valley.—*Reuter's Trade Service* (Budapest.)

Glasgow.—GARAGE EQUIPMENT.—The Corporation Cleansing Committee has instructed the engineer and manager of the Electricity Department to prepare the specifications, &c., for all the electrical apparatus required in the new garage at Govan in connection with the charging of the batteries of the electric vehicles, &c. The Measurer is to be instructed to arrange that the electric lighting of the garage will be included in the specifications and schedules of quantities to be issued by him for the construction of the building. It was also agreed that the engineer and manager of the Electricity Department should be asked to supervise the construction of the electrical work.

Heywood.—NEW ROUTE.—The *Manchester Guardian* reports that at a recent meeting of the Town Council it was reported that all the sanctions had now been received for the widening of Middleton Road and the laying of a tramway to connect the Manchester tram service at Middleton with the Heywood service at Hopwood, and so provide a through service from Heywood to Manchester. The cost is estimated at £100,000, and grants will be received from the Ministry of Transport, the Lancashire County Council, and the Unemployment Grants Committee.

Increase of Charges.—The Minister of Transport has made an Order under the Statutory Undertakings (Temporary Increase of Charges) Act, 1918, authorising certain fare changes by the Dundee Corporation Tramway.

Middlesbrough.—FARES.—The Corporation Tramways Committee has approved a scheme by which it will be possible for passengers to take omnibus tickets from the Hartlepools, cross the transporter bridge over the River Tees, and then go on by the Corporation tramway service to a point where other 'buses can be taken.

Telegraph and Telephone Notes.

Bolivia.—MARCONI CONTRACT.—Under a twenty years' Government contract, Marconi's Wireless Telegraph Co. has undertaken the control and operation of the entire postal telegraph and wireless services of Bolivia; the services were taken over on May 1st. This is the second contract of its kind entered into by Marconi's Co. in South America, the first being with the Peruvian Government in 1921. Modern apparatus will be introduced.

France.—NEW RADIO SERVICE.—The official inauguration of direct wireless communication between France and French Equatorial Africa took place on April 29th. The station at Brazzaville is another link in the chain of wireless stations which are being constructed in accordance with the plans of the Government; it will not only be used for the transmission of commercial messages, but will also serve for the dissemination of weather forecasts, time signals, and all information of use to shipping. The construction of the new station was begun in 1920; it will be staffed by nine Frenchmen, aided by natives.—*Reuter.*

Germany.—CHEAPER TELEPHONES.—A reduction of 33⅓ per cent. in the charges for the public telephone service took effect on May 1st, bringing the price down to ten pfennigs (roughly one penny per call). Hitherto it has been fifteen pfennigs, which odd price necessitated all users of public telephones purchasing special disks, slotted and nicked in a special way to deter "coiners," for insertion in the telephone boxes. For the lowered rates new boxes have been introduced which will take the ordinary ten-pfennig pieces.—*Reuter* (Cologne).

Hull.—FOREIGN TELEPHONES.—The Hull Corporation Telephone Committee has accepted a tender for Belgian automatic table telephones and bell sets at a cost of £337; the lowest British tender was £475.

Portugal.—MARCONI "BEAM" STATIONS.—An extension of wireless telegraph facilities took place on April 30th with the inauguration of services between Lisbon and the Portuguese colonies of Cape Verde, Angola, and Mozambique. The opening of these services completes the network of wireless communication which Marconi's Wireless Telegraph Co., Ltd., undertook to construct for the Portuguese Marconi Co. in accordance with the concession obtained from the Portuguese Government in November, 1922. Direct wireless communication is now established between Lisbon and all the principal Portuguese colonies, which also have a complete system of wireless communication with one another. Services to the Portuguese Islands of Madeira and Azores were opened on December 15th last. Direct services between Lisbon and London, Paris, and Berlin have also been opened during the last few months, and a direct service with Rio de Janeiro is expected to be opened almost immediately. The English group of stations with which the Portuguese stations at Lisbon communicate are the Marconi stations at Ongar and Brentwood, in Essex. The transmitters for communication between Portugal and South America, Mozambique, Cape Verde, and Angola are operated on the short-wave "beam" system.

Turkey.—REOPENING OF TELEGRAPH STATIONS.—A convention was signed on May 1st with the Eastern Telegraph Co. organising the opening of the Company's stations at Constantinople and Smyrna for a period of 30 years.—*Reuter* (Constantinople).

Transatlantic Cables.—NEW DIRECT SERVICE.—The Western Union Telegraph Co. announces that on May 10th direct cable-working in each direction will be inaugurated between London and Boston, Mass., U.S.A., over one of the nine Atlantic cables operated by the company.

The cable steamer *Teleonia* recently arrived at Valentia, Kerry, Irish Free State, where she is to undertake some repairs to the transatlantic cable.

Radio Notes.

Australia.—LICENCES.—According to returns prepared by the Postal Department, the number of broadcast receiving licences held throughout the Commonwealth at the end of February was 197,872, which represents 3.2 per cent. of the population. Victoria was first amongst the States with a total of 114,428 licences, compared with 51,154 in New South Wales, 20,425 in Queensland, 15,773 in South Australia, 4,014 in West Australia, and 2,078 in Tasmania. The number of persons per 100 of the population in each State who held receiving licences at the end of February were as follows:—Victoria, 6.1; South Australia, 2.7; Queensland, 2.3; New South Wales, 2.2; West Australia, 1; Tasmania, 1.

Irish Free State.—LICENCE REVENUE.—The fact that in January, February, and March, 1927, the authorities collected £8,315 in licence fees alone is considered by the *Cork Examiner* to be evidence in itself that radio broadcasting in Ireland "is an extremely businesslike proposition."

Licences.—STILL INCREASING.—At the end of March, 1927, the number of Post Office receiving licences current was 2,253,845, an increase of 18,845 as compared with February, 1927, and an increase of 241,845 as compared with May, 1926.

Rhodesia.—NEW STATION.—A broadcasting station to be established in Southern Rhodesia within the next ten months to operate in conjunction with the Johannesburg station, and will relay the evening programmes transmitted therefrom, says *The Times*. The African Broadcasting Co. is applying to the Southern Rhodesian Government for a licence, and is asking for alterations in the existing regulations in order that "pirates" may be dealt with.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—MELBOURNE.—June 1st. Victorian Government Railways. Electric time-releasing mechanisms. (B.X. 3431.)*

July 5th. State Electricity Commission. One 15,000-kW steam turbo-generator and accessories. (B.X. 3369.)*

July 4th. 66,000-V and 22,000-V insulators for the Yallourn brown coal scheme. (See this issue.)

June 28th. Postmaster-General's Department. Jacks, switchboard instruments, &c. (B.X. 3474.)*

SYDNEY.—June 22nd. New South Wales Government Railways. Remote-control switchgear. (B.X. 3442.)*

June 20th. Municipal Council. Turbo-alternators for Bunnerong power station. (B.X. 3443.)*

BRISBANE.—May 18th. City Electric Light Co., Ltd. Outdoor switchgear. (B.X. 3456.)*

Barking.—May 9th. County of London Electric Supply Co., Ltd. Cables and accessories for the Barking power station. (April 1st.)

Belgium.—May 18th. Service du Matériel des Chemins de Fer Belges, 21, Rue de Louvain, Brussels. Supply of 7,500 metres of insulated cable, 1,550 metres of bare copper wire, 6,000 metres of wire, and 1,000 metres of annealed copper flexible cable for brushes. Particulars (Cahier des Charges Special, No. 50-199-182) for 2½ fr.

May 18th. Belgian Post and Telegraph Authorities at La Salle Madeleine, Brussels. 46,235 metres paper-insulated armoured cable, 48,627 metres ditto, but with outer armouring. Particulars (Cahier des Charges Special No. 3-238) for 14 fr.

Chile.—SANTIAGO.—July 18th. Chilean State Railways. Materials for electric lighting and power (Group 30). Materials for electric lighting of locomotives and coaches (Group 32). August 22nd. Signalling telegraph and telephone supplies (Group 36). (C.X. 2271.)*

Darton.—May 17th. West Riding Education Committee. Electric lighting installation at Darton Kexborough new school. Specifications from Education Department, County Hall, Wakefield.

Darlington.—May 23rd. Electricity Committee. One 500-kW rotary convertor, with transformer. (See this issue.)

Dewsbury.—May 13th. Electricity Committee. Six months' supply of washed smalls required at the electricity works. Mr. R. W. Grubb, borough electrical engineer, Bradford Road.

Dublin.—May 23rd. Electricity Department. Pipework for the 5,000-kW turbo-alternator. (See this issue.)

Dundee.—May 19th. Electricity Department. 2-core and 4-core l.p. cable. D.c. and a.c. house-service meters. (See this issue.)

Edinburgh.—May 16th. East Lothian Education Authority. Works, including electric lighting installation, for the extensions, &c., at Macmerry Public School. Schedules from the surveyors, Messrs. R. & A. K. Smith, 44, Queen Street, Edinburgh.

Egypt.—Cairo.—May 24th. Director-General of Prisons. Twelve months' supply of electric lamps, &c. (C.X. 2268.)*
June 4th. Egyptian State Railways, Telegraphs and Telephones, Chief Inspecting Engineer, Queen Anne's Chambers, S.W. Underground cables (approx. £E12,000 to £E113,000). —*Reuter's Trade Service* (Cairo).
May 28th. Ministry of Education. Electrical equipment for Beni Suef Trades School. (B.X. 3488.)*

Epsom.—Electricity Department. E.h.p. cable. (See this issue.)

Glasgow.—May 18th. Electricity Department. Cables, small i.r. insulated cables and flexibles, meters and carbons for 12 months. (See this issue.)
May 9th. Education Authority. Electric lighting installations in a number of schools. Forms, &c., from Education Offices, 129, Bath Street, Glasgow.

London.—St. Marylebone.—May 18th. Electricity Department. L.p. and e.h.p. cables for 12 months. (April 15th.)
Islington.—June 1st. Electricity Department. Steel-tube lamp columns, 2,200-V feeder switchgear, rotary and/or static power factor correctors. (April 22nd.)
Metropolitan Asylums Board.—May 18th. Installation of a multiple roller ironing machine; new steam boiler, &c.; steam main; electric power in laundry, &c., at Darenth Tramway Colony; conversion of mechanical stokers to hand firing at North-Eastern Fever Hospital. (April 29th.)
London County Council.—May 17th. Electrical installation at the Albion Road, Stoke Newington, Central School (approx. 133 points). (See this issue.)

Manchester.—May 10th. Tramways Committee. Trucks, motors, and controllers for electric tramcars; tramway poles, span-wire brackets, trolley wire, and copper bonds. Steel girder tramway rails. Mr. H. Mattinson, general manager and chief engineer, 55, Piccadilly, Manchester.
14th May. Electricity Committee. Twelve months' supply of cast-iron junction boxes and socket bends, weldless steel lamp columns, fittings, and street lanterns. Mr. H. C. Lamb, chief engineer and manager, Electricity Department, Town Hall.

New Zealand.—Wellington.—June 21st. Public Works Department. Sub-station switchgear and metering equipment for Arapuni (B.X. 3398.)*
June 7th. Railway sub-station equipment, Lake Coleridge electric power scheme. (B.X. 3295.)*
June 13th. New Zealand Railways. Machine tools, workshop equipment and overhead electric travelling cranes. (A.X. 4344.)*
June 6th. Six electric locomotives. (A.X. 4355.)* Overhead equipment for the Christchurch-Lyttelton electrification scheme. (B.X. 3301.)*
Invercargill.—May 31st. Southland Electric Power Board. Transformers. (B.X. 3379.)*
June 15th. 66,000-V oil circuit breakers. (B.X. 3378.)*
Lyttelton.—July 20th. Harbour Board. Four 5-ton electrically-operated portal cranes, and ten electrically-operated capstans. (A.X. 4352.)*
Auckland.—July 4th. Auckland Electric Power Board. Switchgear. (B.X. 3471.)*

Salford.—May 14th. Public Health Committee. Electrical installation at Drinkwater Park Hospital, Prestwich. Specifications from Medical Officer of Health, 143, Regent Road, Salford.

Sleaford.—May 17th. Electricity Department. Cables, boxes, &c. (April 29th.)

Scarborough.—June 3rd. Corporation. Installation of electrical pumping plant in duplicate for the new Irton water scheme No. 2. Specifications (£5) from Dr. H. Lapworth, engineer, 25, Victoria Street, S.W.

Thorne.—May 17th. West Riding Education Committee. Electric lighting installation at new boys' school. Specifications, &c., from Education Department, County Hall, Wakefield.

Uruguay.—Montevideo.—June 15th. State Electricity Supply Works. 15 transformer sub-station equipments (6,600/220 V, 50 cycles). (B.X. 3371.)* Five overhead transformer sub-stations mounted on tubular or section iron columns. (B.X. 3430.)*

Whitley.—Electricity Department. One 1,000-kW turbo-alternator, with condenser, pumps, air filter, &c.; one 200-kW semi-Diesel or heavy-oil engine alternator. (See this issue.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Bedford.—Electricity Committee.
Feed-water heater and pipe work (£296).—Ledward and Beckett. (Accepted.)
Overhead cable in connection with supply to Ampthill (£4,600).—R. M. Russell. (Recommended.)

Brighton.—Lighting Committee. Accepted:—
Switchgear (£251).—Metropolitan-Vickers Electrical Co., Ltd.

Cheltenham.—Electricity Committee. Accepted:—
Renewing parts of grate stoker (£152).—Babcock & Wilcox, Ltd.

Czecho-Slovakia.—Messrs. Standard Telephones & Cables, Ltd., has received a contract to manufacture and install a 3-kW standard broadcasting radio equipment at Kosice (Kassa).

Erith.—Urban Council. Accepted:—
Cables for a year (£4,361).—Callender's Cable & Construction Co., Ltd.

Glasgow.—Electricity Committee. Recommended:—
Ash tank for boiler house at Dalmarnock power station (£671).—Babcock & Wilcox, Ltd.
Tramways Committee. Accepted:—
Storage battery for power station and sub-stations.—Tudor Accumulator Co., Ltd.
Telephone and test cable.—Hackbridge Cable Co., Ltd.
Special track work.—Thermit, Ltd.; Edgar Allen & Co., Ltd.; and Titan Trackwork Co., Ltd.

Gloucester.—Electricity and Light Railways Committee. Cables, &c., in connection with the supply of electricity to the Gloucester Rural District (approx. £46,945).—British Insulated Cables, Ltd. (Recommended.)

Hull.—The Corporation Telephones Committee has accepted a Belgian tender for automatic table telephones and bell sets at £337. The lowest British tender was £475.

Ilford.—Town Council. Accepted:—
Electricity meters.—Edison Swan Electric Co., Ltd.; Ferranti, Ltd.; R. Hornsby & Co., Ltd.; Landis and Gyr, Ltd.; and Measurement, Ltd.

Lamp Contract.—
Nine months' contract for "Osram" metal-filament and "Robertson" carbon-filament lamps for the Bolsover Colliery Co.—General Electric Co., Ltd.

London.—Battersea.—Electricity Committee. Accepted:—
Insulated glazed platform for switchgear gallery (£160).—British Luxfer Prism Syndicate, Ltd.
Poplar.—Electricity Committee.
Earthing at new power station. Five neutral-point earthing cubicles for machines in old station; 1 limiting resistance for old station; 1 limiting resistance for new station, complete with indicating device to show which machine is earthed:—

Metropolitan-Vickers Electrical Co., Ltd. (Recommended.)	**£546**
General Electric Co., Ltd.	555
Johnson & Phillips, Ltd.	789

Metropolitan Asylums Board.—Hospitals Committee. Recommended:—
X-ray equipment at Northern Hospital (£125).—Newton and Wright, Ltd.

Portsmouth.—Electricity Committee.—The following tenders were received for the installation of coal-handling plant at the power station:—

	Part 1. £	Part 2. £	Total £
Aldridge & Ranken, Ltd. ...	6,249	6,005	12,254
(Alternative)	6,739	6,444	13,183
Babcock & Wilcox, Ltd. ...	6,579	6,423	13,002
(Alternative). (Recommended.)	**7,037**	**6,423**	**13,460**
Ed. Bennis & Co., Ltd. ...	7,800	6,088	13,888
Fraser & Chalmers Engineering Works	8,269	7,459	15,728
Strachan & Henshaw, Ltd.	—	—	16,350

Cable (£1,038).—Johnson & Phillips, Ltd.

Sheffield.—Electric Supply Committee. Accepted:—
Automatically-operated traction sub-station equipment, comprising one 750-kW convertor, with switchgear and accessories (£4,300).—English Electric Co., Ltd.

Smethwick.—Estates Committee. Accepted:—
Electric pump (£160).—Tangyes, Ltd.

Warrington.—Tramways Committee. Accepted:—
Manganese crossing.—Hadfields, Ltd.
Electricity Committee. Accepted:—
Repairs to 3,000-kW set.—English Electric Co., Ltd.

York.—Education Committee. Recommended:—
Installation of electric lighting at Tang Hall school (£763).—A. E. White, York.

Forthcoming Events.

Junior Institution of Engineers.—Friday, May 6th. 39, Victoria Street, S.W. 7.30 p.m. Ordinary meeting.

Chemical Engineering Group.—Friday, May 6th. Imperial College of Science and Technology, South Kensington, S.W. 6 p.m. Annual general meeting. 8 p.m. "Chemical Fire Extinguishers." Dr. W. R. Ormandy.

Royal Society of Arts.—Monday, May 9th. 8 p.m. Cantor lecture. "The Measurement of Light." Mr. J. W. T. Walsh. (Lecture III).

Wednesday, May 11th. 8 p.m. "English Railways." Prof. W. E. Dalby, F.R.S.

Institution of Electrical Engineers (Western Centre).—Monday, May 9th. Plymouth. Summer meeting.

Institution of Civil Engineers.—Tuesday, May 10th. London. 6 p.m. Annual general meeting.

Association of Mining Electrical Engineers (South Wales Branch).—Saturday, May 14th. South Wales Institute of Engineers, Cardiff. 6 p.m. Annual meeting.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the name and address of makers of the following:—

DAYCOLITE fittings.

Notes.

Extensions at Aldershot.

On April 25th a ceremony at Farnborough took the form of the laying of a foundation corner stone, by Councillor T. Cochrane, chairman of the No. 11 District Joint Industrial Council for the Electricity Supply Industry, for the future extensions of the North Camp and Farnborough Works of the Aldershot Gas, Water and District Lighting Co. With the advent of an Extension of Area Order now emerging it is estimated that the electricity output of the company for 1931 will be 3 million units, and for 1933, 5 millions. The policy of the undertaking with regard to the generation of electricity has been to link up the various primary departments. The company has two large works, one at North Camp, occupying an area of 30 acres, and another at Ash Road, Aldershot, covering 46 acres. The former site has certain peculiar advantages in favour of the installation of a large generating station. The main railway line between Dover and the North runs through the works, and the River Blackwater forms a boundary of the site. Further, it is in a favourable position geographically for linking up with other districts, such as Ascot, Guildford, and Winchester.

At the ceremony the chairman of the company, Mr. R. W. Edwards, compared the charges which the company was to introduce from the Midsummer quarter, with those prevailing in the London and Home Counties Electricity District, where the average lighting, power, and heating and cooking rates were 6.75d., 2.81d. and 2.07d. per kWh, respectively. The minimum Aldershot charge would be 1.875d. per kWh. He pointed out that the load factor of the station compared very favourably with those of some of the largest undertakings. The highest weekly load factor for 1925 was 48.0 per cent., and for 1926, 42.9 per cent. This was attributable to the unity of working between the various departments of the company.

The Electrical Trades Benevolent Institution.

The annual general meeting of the E.T.B.I. was held on Thursday last week, with Dr. W. H. Eccles, president I.E.E., in the chair. The report of the Committee of Management for the year 1926 showed that the income from contributions was £7,115, making with the receipts from dividends and other sources the total income of £8,651. An amount of £7,219 had been carried to capital account after the payment of grants and expenses. In respect of the year the sum of £1,571 had been invested, bringing the total of invested funds to £26,176 at cost. The necessity of the Institution was more strongly demonstrated than in any previous year, the number of grants having been 75, amounting to £1,105, compared with 81, amounting to £934, in 1925. Every qualified applicant received assistance.

The activities of the Local Advisory Committees had continued to be of great benefit, not only in increasing the contributions, but also in enabling persons requiring assistance to know that it could be obtained from the Institution. The Committee hoped that further committees of this kind would be created, and invited the co-operation of leading persons in large towns. There were such committees in Cardiff, Manchester, Newcastle-on-Tyne, and Glasgow.

The annual festival, held on November 10th, 1926, was presided over by Sir Hugo Hirst, Bart., president of the Institution. Thanks to the extraordinary efforts made by the president, his appeal resulted in the collection of £6,912.

Commenting on the report and accounts, the chairman pointed out that the income for the year was £8,651, compared with £3,128 in 1925. The income resulting from the annual festival exceeded the largest amount previously collected at a festival; the previous best was that which was collected in 1914, and the chair on both occasions was occupied by Sir Hugo Hirst, as president. The contributions resulting from the efforts of the Newcastle Local Committee were almost double those collected in the previous year. The thanks of the Institution must be given to them and to the committee of the Engineers' Ball, and to the executors of the late Mr. A. P. Lundberg who, acting on what they thought would be his desire, generously gave a contribution of £50. The dividends on investments for 1926 were £1,234, compared with £1,175 in the previous year. The total administration expenditure amounted to £296, as compared with £299 in the previous year. Since the end of 1926 £5,261 had been invested.

The report and accounts were adopted, and new rules prepared by a special sub-committee and carefully considered by the Committee of Management were adopted in place of the existing rules; they have to be confirmed at a subsequent general meeting. Reference was made to the death of Captain R. J. Wallis-Jones, who was one of the most energetic members of the Committee.

The Committee of Management was elected, and was empowered to constitute the Council under the new rules if, and when, the new rules were confirmed.

Educational.

A special course of six lectures on "Electrical Engineering Economics," by Mr. D. J. Bolton, B.Sc., will be held at the Regent Street Polytechnic, London, on Thursdays commencing May 12th (excepting June 9th), from 6.30 to 8.30 p.m. The course is intended for electrical students who wish to gain an insight into the economic calculations upon which so many engineering decisions depend. The fee for the course to students residing or employed within the administrative county of London, or residing in Middlesex or Kent, is 7s. 6d.

A Scottish Power Consumers' Association.

It has been decided to form an Ayrshire Electric Power Consumers' Association, and a meeting will be held on May 12th to adopt a constitution and rules. The objects of the Association are to advise members on matters relating to the use and application of electrical energy, to protect the interests of members in respect of cost and conditions of supply, and generally to safeguard and promote the interests of the members as consumers. All consumers, other than for domestic purposes, are eligible for membership. The secretary is Mr. J. D. Wyllie, solicitor, 37, Bank Street, Kilmarnock.

B.E.S.A. Publications.

Two British Standard Specifications for Instrument Transformers (No. 81, 1927), and Graphic (Recording or Chart-Recording) Ammeters, Voltmeters and Wattmeters (No. 90, 1927), have recently been issued by the British Engineering Standards Association. These are revisions of the 1919 editions, and have been brought into line with other B.S.S.'s for electrical instruments, there now being a series of four up-to-date specifications: Indicating Instruments, No. 89; Graphic (Recording) Instruments, No. 90; Electrical Protective Relays, No. 142; Instrument Transformers, No. 81.

No. 81 deals with the testing of current and voltage transformers, the rated secondary current or voltage, ratios of transformation, limits of temperature rise and the rated burdens. Each type of transformer is graded into four classes, according to the use to which the transformer will be put, and the limits of error for each class are laid down. A useful series of appendices are included, dealing with such matters as the conditions affecting the construction and use of transformers, terminal markings, notes on the selection of current transformers, the limitations of single-turn current transformers, and the method of measuring temperature rise.

Publication No. 90 is in effect a sister specification to B.S.S. No. 89, special attention being devoted to the driving mechanism and to the effect of the pen-to-paper friction. Chart speeds and chart rulings are also dealt with, as are also the limits of error and the methods of testing for accuracy. The allowances to be made for the effect of external magnetic fields, changes in frequency, power factor, and the amount of ink, &c., are specified. Appendices are included, dealing with notes on the accuracy of different types of instrument, charts and driving mechanism, terminal markings, and so on.

Copies of the revised specifications may be obtained from the Publications Department, British Engineering Standards Association, 28, Victoria Street, London, S.W.1, price 2s. 2d. each, post free.

Appointments Vacant.

Assistant master in electrical engineering, for the Rugby Technical School. Charge engineer for the City of Stoke Electricity Department. Canvasser (£257) for the Hammersmith Borough Council Electricity Department. Telephone inspector (£300) for the Government of British Guiana Post Office Department. Assistant district engineer (approx. £630) and assistant installation engineer (approx. £490) for the Municipal Commissioners of Singapore Electricity Department. (See our advertisement pages to-day.)

Irish Free State Electricity Supply.

The Irish Free State Government's Electricity Supply Bill last week passed its final stage in the Dail by 36 votes to 17, and now awaits consideration by the Senate. It is expected that the Bill will be passed into law this month, but various urgent appeals have been made to the Senate to exercise its constitutional powers to hold it up pending the result of the Dail General Election in June. The Government's position is held to be precarious, and should it not return to power the part of the scheme which aims at consolidating the distribution of electrical power in the State might be abandoned. In the Dail, Mr. Johnson, leader of the Labour group, said the Bill's main defect was the absence of any Parliamentary supervision. The refusal of the Minister for Industry and Commerce to make any concession on any vital point has aroused fresh indignation. He would not even agree that the members of the Board should be experts in electricity management. Major Bryan Cooper remarked that the position was that the Board of Control was to be given a blank cheque with power to do as it liked.

At a meeting of Rathmines Urban Council, Sir S. Maddock, chairman, alluded to the confiscatory powers of the Bill, dwelling on the claim that the town's electricity undertaking had been developed by the ratepayers' money, and that they now had a substantial yearly surplus from it. They had no assurance that under the Government Bill the town would be as well served.

Mr. A. R. Monks, chairman of the Cork Electric Tramway and Electric Lighting Co., at the annual meeting, said that the future of the company was uncertain in view of the Government's Bill.

The Minister for Industry and Commerce having given his sanction to the raising of a loan of £150,000 by the Dublin City Administrative Commissioners for work in connection with the city's electricity concern, the Commissioners have decided to create redeemable stock, and an issue will be made accordingly.

Artificial Sunlight.

"Sunlight baths," by the use of mercury-vapour lamps recently installed at the Bradford Corporation Central Baths, were opened to the public on April 25th. The first installation, for which four dressing cubicles have been set aside, has cost £200 and is for gentlemen only, but the treatment will shortly be available for ladies also. The bath periods vary from one to ten minutes, and an electrical timekeeper is being installed to ensure against overdose. It is anticipated that a future development may be the installation of sunlight lamps over the big swimming bath.

University of London.

On Tuesday next, May 10th, graduates in science of the University of London, who are members of Convocation, will elect three graduates to fill vacancies among the five Convocation members of the Senate who represent Science. None of the Science representatives hitherto has been an engineer in practice, though many engineers have graduated in Science at the University, and it is very desirable that the special needs of the engineering profession should be adequately put before the Senate; we are very glad, therefore, to learn that Mr. Roger T. Smith, B.Sc., M.Inst.C.E., Past-president of the Institution of Electrical Engineers, and partner in the firm of Highfield and Roger Smith, consulting engineers, Westminster, is a candidate for one of the vacancies, and we venture to urge all engineers who are science graduates and members of Convocation to help to secure representation on the Senate by voting for him. Mr. Roger Smith, who is an official candidate of the XXth Century Society of London Graduates, has held many public appointments in connection with scientific and engineering movements, both national and international in scope, and has made a special study of educational problems relating to the profession of engineering, the development of pure and applied science, and the advancement of research; he is backed by an imposing list of nominators and supporters, including Professor W. E. Dalby, Dr. W. H. Eccles, Prof. J. A. Fleming, Sir T. Gregory Foster, Sir Oliver Lodge, and Dr. W. C. Unwin. The matter is of importance in view of impending changes in the Constitution of the University, and we hope that readers who are voters will do their utmost to ensure the election of so efficient a representative of science and engineering.

Works Visit.

Arrangements have been made for the Birmingham Electric Club to visit the works of the English Electric Co., Ltd., and the Siemens & English Electric Lamp Co., Ltd., at Preston, on May 20th. Reserved saloon accommodation will be provided from New Street Station, Birmingham, 9.10 a.m. Members wishing to take part in the visit should communicate immediately with the Hon. Soc. Secretary, Mr. F. W. Martin.

Institution Notes.

Institution of Electrical Engineers.

NORTH-EASTERN CENTRE.—The report of the Committee presented at the annual meeting at Newcastle-upon-Tyne on April 25th shows that nine ordinary meetings, two informal meetings, and a Faraday Lecture (on two occasions) were held, the average attendance being 74, as compared with 88 in 1925-26. Over 500 persons attended at the November Faraday Lecture, and so many were unable to obtain admittance that Dr. Thornton repeated the lecture in January. The membership of the Centre decreased by 12 to 510. The Tees-side Sub-Centre membership is approximately 20 per cent. of the total, and the Committee notes with regret the falling-off in the membership of the Students' Section. It is hoped that the proposed amendments of the membership regulations now under consideration by the Council of the Institution will remove some of the difficulties which have led to complaints from Students and Graduates. Negotiations are in hand for the establishment of a library, which will be housed in the Armstrong College Library. Detailed particulars will be issued shortly to members. The committee for the next session is as follows:—*Chairman*: Hugh Paterson; *vice-chairmen*: E. Fawssett and P. F. Allan; *hon. secretary*: H. B. Poynder; *new members of committee*: W. T. Maccall, L. E. Mold, H. L. Riseley, B. A. Robinson, and F. H. Williams.

MERSEY AND NORTH WALES (LIVERPOOL) CENTRE.—The Committee for the 1927-28 session is as follows:—*Chairman*: Prof. F. J. Teago; *vice-chairmen*: S. E. Britton and Prof. E. W. Marchant; *hon. secretary and treasurer*: Oscar C. Waygood; *new ordinary members of committee*: H. C. Hazel, W. M. Horsfall, F. V. L. Mathias, and J. L. F. Vogel.

SCOTTISH CENTRE.—On April 12th a paper on "The Application of Machinery at the Coal Face," by Mr. Sam Mavor, was, owing to his absence in London, read by his nephew, Major J. B. Mavor. There was a good attendance of members, and representatives of the Association of Colliery Managers, the Mining Institute of Scotland, the West of Scotland Iron and Steel Institute, and the Institution of Mining Electrical Engineers were also present, and a discussion ensued. The following office bearers for the 1927-28 session were duly elected:—*Chairman*: D. M. Macleod; *vice-chairmen*: G. Morgan and E. Seddon; *hon. secretary*: Joseph Taylor; *asst. hon. secretary*: H. V. Henniker; *committee*: Prof. F. G. Baily, F. H. Whysall, J. Macdonald, N. C. Bridge, H. W. Bewsher, Prof. S. Parker Smith, A. S. McWhirter, R. B. Mitchell, J. C. Macfarlane, J. K. Murray, D. S. Munro, J. M. Scott-Maxwell, and F. Frain, P. Philip, and R. K. Robertson (representatives of the Dundee Sub-Centre).

Excursion.—On Saturday, April 30th, members took part in an excursion by road to Dunkeld, where luncheon and tea were served in the Atholl Arms Hotel, the party returning to Dundee *via* Perth and the Carse of Gowrie. A large number of members and friends, including ladies, took part, the excursion being greatly enjoyed by all.

The Institute of Fuel.

A joint meeting of the vice-presidents and members of the Councils of the Institution of Fuel Technology and the Institution of Fuel Economy Engineers was held under the chairmanship of Sir Alfred Mond on Friday, April 29th. As president of both Institutions, in November last, Sir Alfred Mond, having found a general desire both amongst those most closely associated with the problems of fuel economy and amongst those throughout the country who had a general interest in the question, that the two existing Institutions should be merged into one, suggested terms of fusion. The following terms of fusion were subsequently accepted by the Councils of both Institutions:—

(1) That the name of the merged Institutions be "The Institute of Fuel."

(2) That the Councils of both Institutions as constituted at present be merged and form the Council of the "Institute of Fuel," and that in the autumn following the inauguration of the Institute of Fuel, a new Council shall be elected by ballot of the members of the Institute.

(3) That the present honorary secretaries of each present Institution be joint honorary secretaries of "The Institute of Fuel."

At the meeting the final steps for the fusion of the existing Institutions and the inauguration of the "Institute of Fuel" were taken. Sir Alfred Mond expressed his great gratification that the fusion had been successfully accomplished, and thanked the vice-presidents, chairmen, and members of the Councils of both Institutions for their co-operation in bringing about the present happy result.

Junior Institution of Engineers.

In a paper entitled "The Design and Balancing of 3-phase Low-Tension Systems," read before the Institution on April 29th, Mr. W. Fordham Cooper, B.Sc., put forward some theories for the design of cable networks in developing areas. He said that the deliberations recorded in his paper arose from his experiences during the last six months, when the heating load on the system with which he was concerned was increasing at an alarming rate. He had tried to find some definite basis on which to go forward, a basis which

although obtained from theories deduced from past experience, would be better than mere rule of thumb. Mr. Cooper set out in detail particulars and calculations relating to the theories that he advanced; he said that many of the results which were given were admittedly tentative and awaited confirmation by experience.

Mr. E. Ambrose, in the discussion, criticised Mr. Cooper's use of theoretical formulæ. He said that mains engineers had a fund of collected knowledge and experience which constantly progressed and served a more useful purpose than sets of formulæ which periodically had to be changed.

Institute of Transport.

The sixth Congress of the above Institute is to be held at Birmingham from May 19th to 21st. The president, Mr. R. H. Selbie, C.B.E., will receive members and visitors in the Warwick and Dudley Rooms, Queen's Hotel, from 7 to 10 p.m. on Wednesday, May 18th. The proceedings will include the reading and discussion of papers, and visits to works, &c. The papers to be read will include "Traffic Control," by Mr. J. H. Follows, C.B.E., L.M.S. Railway, and "Transport in England—A Brief Historical Survey," by Principal C. Grant Robertson, Birmingham University.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Mr. JOHNSTONE WRIGHT, M.I.E.E., electrical engineer and general manager of the Belfast electricity undertaking, has been offered and has accepted an important appointment under the Electricity Commission of Great Britain.

Mr. V. DELEBECQUE, who ceases to be general manager of Electric Fans, Ltd., from to-morrow, May 7th, asks for correspondence to be addressed to him at 26a, St. Peter's Square, Hammersmith.

At the annual dinner of the Bradford Engineering Society, held on April 29th, Alderman J. W. LONGLEY, deputy chairman of the Bradford Corporation Electricity Committee, was presented with a clock, with Westminster chimes, in appreciation of his services to the Engineering Society.

On leaving Glasgow to take up an important appointment on the engineering staff of the Central Electricity Board in London, Mr. C. W. MARSHALL received a presentation from the officials and staff of the Glasgow Corporation Electricity Department at a dinner given in his honour on April 28th, at which Mr. R. B. Mitchell, engineer and manager, presided. Mr. Mitchell, in making the presentation, complimented Mr. Marshall on his loyal and efficient service with the Electricity Department, and congratulated him on securing the appointment.

The Glasgow Corporation Electricity Committee has appointed Mr. ALEXANDER P. MCKIM, laboratory assistant, to the position of chief technical assistant rendered vacant by the departure of Mr. C. W. Marshall.

Reuter's correspondent at Wellington states that Mr. A. GIBBS, chief telegraph engineer of the New Zealand Postal Telegraph Department, is leaving on a world tour to investigate developments in wireless broadcasting, telegraphic and telephone services. He will also represent New Zealand at the International Radio-Telegraph Conference at Washington in October.

Mr. E. E. HOADLEY, M.I.E.E., borough electrical engineer at Maidstone, and Mrs. HOADLEY, celebrated their silver wedding on April 29th.

Mr. F. FERNIE has recently joined the staff of Messrs. Watsham's, Ltd., Windsor House, Victoria Street, S.W.1, electrical contractors for cable and overhead line work.

Bedford Corporation Electricity Committee reports that under the unit system the salary of the borough electrical engineer will now be £1,060 per annum.

Many distinguished electrical and other gentlemen were present at the Savoy Hotel on Wednesday night last week, when the directors of the Charing Cross Electricity Supply Co., Ltd., gave a dinner to Mr. JOHN M. GATTI, the new chairman of the London County Council.

Mr. F. W. H. WHEADON, M.I.E.E., engineer and manager of the Adelaide Electric Supply Co., Ltd., has been elected to a seat on the board with the title of managing director.

Mr. CLIFFORD MITCHELL, late works manager to Marconi's Wireless Telegraph Co., Ltd., of Chelmsford, has been appointed general works manager of the Crittall Manufacturing Co., Ltd., of the same town.

Mr. OSWALD G. COOK, who was for some years with the Morecambe Corporation Electricity Department, and later under the War Department, was one of six selected applicants (out of over 400) to appear before the Committee for the post of engineer to the Hendon Union Redhill Hospital.

In our last issue we erroneously stated that Alderman W. T. DAGNALL had been elected chairman of the South-East Lancashire Electricity Advisory Board in succession to Alderman W. Walker. Ald. Dagnall was *re-elected* to the position, which he has held since the formation of the Board.

Mr. TREECE, who has been works manager of Messrs. Electricars, Ltd., of Birmingham, for the past six years, has been appointed general manager. In future his time will be divided between London and Birmingham.

On Monday last Mr. L. W. OLIVER, mains superintendent, Aylesbury Electricity Undertaking, was presented with a silver cigarette case by Mr. Turnbull, the chief engineer, on behalf of the staff, upon leaving to take up an appointment with the British Electric Transformer Co., Ltd. He joined the Aylesbury undertaking as an apprentice in 1915.

Mr. H. G. BAKER has relinquished his position as London sales manager of Messrs. Falk, Stadelmann & Co., Ltd., after 18 years' service. He will operate on his own account as a wholesale distributor of electrical accessories at 56, Millman Street, London, W.C.1, for the present.

Mr. SIDNEY GREEN, for many years with the St. James's and Pall Mall Electric Light Co., Ltd., and the Central Electric Supply Co., Ltd., has been transferred to the London Power Co., Ltd., on the engineer-in-chief's staff, as stores superintendent and buyer. He took up his duties at Horseferry Road, S.W.1, on May 2nd.

Obituary.—MR. W. E. WIMHURST.—The death occurred on April 24th, at Dawlish, at the age of 59 years, of Mr. W. E. Wimhurst, who was for 32 years with Callender's Cable and Construction, Ltd., of Erith, and at his retirement was cashier at the Belvedere factory.

VISCOUNT COWDRAY.—We regret to record the death of Viscount Cowdray, which occurred on Sunday morning last at the age of 70 years. As head of the firm of S. Pearson and Son, public works contractors, he was responsible for the construction of some of London's underground tube railways.

MR. A. CAMPBELL.—*The Times* records the death, which occurred at Felbridge, East Grinstead, on April 30th, in his 78th year, of Mr. Archibald Campbell, "late M.I.E.E."

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

J. Roberts, Sons & Eccles, Ltd.—Private company. Registered April 13th, in Belfast. Capital, £2,000 in £1 shares. To carry on the business of engineers, importers and manufacturers of and dealers in auto-electrical accessories, &c. The first directors are:—J. W. Roberts, 9, Grove Terrace, Belfast, electrical engineer; Mrs. R. A. Roberts, 9, Grove Terrace, Belfast; C. E. Eccles, 1, Victoria Crescent, Sydenham, Belfast, secretary. Qualification, 10 shares. Secretary: C. E. Eccles. Registered office: 12-14, York Lane, Belfast.

D. A. R., Ltd.—Private company. Registered April 25th. Capital, £100 in 1s. shares. Objects: To carry on the business of manufacturers, merchants, and distributors of the preparation called Dar, used for desulphating and prevention of sulphation in electric storage batteries; to open service stations, to act as merchants, distributors, &c. The first directors are:—A. E. Whitelaw, Park Lane Hotel, Piccadilly, W., soap merchant; G. R. Whitelaw (same address), sales manager. Qualification, one share. Remuneration as fixed by the company. Secretary: W. F. Sanders. Registered office: Australia House, Strand, W.C.2.

D. X. Coils, Ltd.—Private company. Registered April 29th. Capital, £250 in 1,000 ordinary shares of 1s. each and 200 6 per cent. (free of income tax) preference shares of £1

each. Objects: To carry on the business of a manufacturing, contracting, commercial, promoting, financial, developing and producing association, especially wireless components, &c. The first directors are:—J. H. Nichols, 102, King Edward Road, E.8; G. Nichols, Rye House, Highams Park, E.4 Registered office, 4 and 5, Glebe Road, Kingsland Road, E.8.

Official Returns of Electrical Companies.

Attaix, Ltd.—Debenture dated March 30th, 1927, to secure all moneys not exceeding £500, for which the holder (S. Rogers, 4, Rotunda Terrace, Montpelier, Cheltenham) may become liable by virtue of a guarantee given to the company's bankers, charged on the company's property, present and future, including uncalled capital, but excluding 106, High Street, Southampton. Also debenture of same date to secure all moneys not exceeding £800 for which the holder (H. Burger, South-Western Hotel, Southampton) may become liable by virtue of a guarantee given to the company's bankers. Property charged: as above.

Tungstalite, Ltd.—Capital, £3,000 in £1 shares. Return dated April 11th, 1927. All shares taken up. £2,700 paid. £300 considered as paid. Mortgages and charges, nil.

Coley & Swinnerton, Ltd.—Capital, £2,000 in £1 shares. Return dated December 31st, 1926 (filed March 2nd, 1927). 1,001 shares taken up. £1,001 paid. Mortgages and charges, nil.

Radio Supply Co., Ltd.—Capital, £1,000 in £1 shares. Return dated December 30th, 1926. 599 shares taken up. £599 considered as paid. Mortgages and charges, nil.

E. Shipton & Co., Ltd.—Capital, £6,000 in 4,000 preference and 2,000 ordinary shares of £1 each. Return dated October 22nd, 1926 (filed January 1st, 1927). All shares taken up. £300 paid. £5,700 considered as paid. Mortgages and charges, nil.

National Electric Lamp Co., Ltd.—Capital, £100 in £1 shares. Return dated November 19th (filed December 15th), 1926. All shares taken up. £100 paid. Mortgages and charges, nil.

H. E. C. Electric Co., Ltd.—Capital, £1,000 in 400 preference and 600 ordinary shares of £1 each. Return dated December 30th, 1926. 170 preference and 202 ordinary shares taken up. £172 paid on 170 preference and 2 ordinary shares. £200 considered as paid on 200 ordinary shares. Mortgages and charges, nil.

Embleton & Barker, Ltd.—Capital, £1,000 in £1 shares. Return dated October 26th, 1926 (filed March 2nd, 1927). All shares taken up. £500 paid. £500 considered as paid. Mortgages and charges, nil.

Rubon, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1926. 2 shares taken up. Nil called up. Mortgages and charges, £500.

Rhayader Electric Light and Power Co., Ltd.—Capital, £2,000 in £5 shares. Return dated November 4th, 1926. All shares taken up. £2,000 paid. Mortgages and charges, nil.

Kye, Ltd.—Capital, £12,000 in £1 shares. Return dated November 30th, 1926 (filed January 27th, 1927). 11,307 shares taken up. £11,307 paid. Mortgages and charges, nil.

Electrical Importers (Hull), Ltd.—Capital, £205 in £1 shares. Return dated December 9th, 1926. 4 shares taken up. £4 paid. Mortgages and charges, £1,000.

Auto Welding and Engineering Co., Ltd.—C. W. Foster, of 100, Finchley Road, N.W.3, was appointed receiver and manager on April 20th, 1927, under powers contained in debentures dated April 24th, 1923.

Radio Communication Co., Ltd.—Satisfaction to the extent of £5,500 on April 21st, 1927, of debenture dated April 14th, 1926, securing £81,500 (£15,000 outstanding).

International Electrolytic Plant Co., Ltd.—Mortgage dated March 31st, 1927, to secure £500 further advances and costs and all moneys for which the mortgagee may become liable by virtue of guarantees up to £1,200 given to the company's bankers, charged on a debt of about £9,517, owing to the company from Société des Engrais Azotes et Composes, Paris. Holder:—H. Rowlands, 41, Temple Row, Birmingham.

Skegness Electricity Supply Co., Ltd.—Issue on March 18th, 1927, of £50 debentures, part of a series already registered.

Lissen, Ltd.—Capital, £3,000 in £1 shares. Return dated December 31st, 1926 (filed April 12th, 1927). 502 shares taken up. £502 paid. Mortgages and charges, nil.

J. Churley Cann, Ltd.—Debenture dated April 7th, 1927, to secure £3,700, charged on company's property, present and future, including uncalled capital. Holder:—A. C. Sufforn, Hill Head, Fareham, Hants.

C. Shardlow & Co., Ltd.—F. Dixon, of National Chambers, 4, Horsefair Street, Leicester, ceased to act as receiver on April 11th, 1927.

Ledger, Taylor & Co., Ltd.—A. T. Winter, of 7, Bridgegate, Retford, I.A.A., was appointed receiver on April 12th, 1927, under powers contained in debenture dated March 11th, 1925.

Samestophone, Ltd. — A. W. Watson, incorporated accountant, of 5, Waterloo Street, Birmingham, was appointed receiver and manager on April 13th, 1927, under powers contained in certain debentures dated January 20th, 1926.

B. N. B. Wireless, Ltd.—Satisfaction in full on March 7th, 1927, of second debentures dated November 22nd, 1923, securing £100.

Horley and District Electricity Supply Co., Ltd.—Mortgage on freehold land and buildings in Victoria Road, Horley, Surrey, dated April 1st, 1927, to secure £1,500. Holder: C. G. Selfe, Massetts Road, Horley, Surrey.

Alpha Electric Welding Co., Ltd.—Debenture dated April 8th, 1927, to secure £2,000, constituting a specific charge on land at Newport, Mon., and all other freehold and leasehold property of the company and a floating charge on the company's undertaking and property, present and future, including uncalled capital. Holders: Branch Nominees, Ltd., 15, Bishopsgate, E.C.2.

Hellyar & Sons, Ltd.—J. M. Moore, of 15, New Street, Bishopsgate, E.C.1, ceased to act as receiver or manager on March 25th, 1927.

Gillespie Valve Manufacturing Co., Ltd.—Capital £200 in 1s. shares. Return dated January 18th, 1927. All shares taken up. £100 2s. paid, £99 18s. considered as paid. Mortgages and charges, nil.

Cecil Hodges & Co. (Overseas), Ltd.—Capital, £1,000 in £1 shares. Return dated September 15th, 1926 (filed January 1st, 1927). 11 shares taken up. £11 paid. Mortgages and charges, nil.

Allerton Electrical Supplies, Ltd.—Capital, £2,000 in £1 shares. Return dated December 31st, 1926. 1,500 shares taken up. £1,500 paid. Mortgages and charges, £1,400.

Waltham Radio, Ltd.—Capital, £1,000 in £1 shares. Return dated February 17th, 1927. All shares taken up. £1,000 considered as paid. Mortgages and charges: £500 debenture.

Stevenage Electric Light and Power Co., Ltd.—Capital, £16,000 in £1 shares. Return dated March 15th, 1927. All shares taken up. £16,000 paid. Mortgages and charges, nil.

Robson, Paling & Co., Ltd.—Capital, £2,000 in £1 shares. Return dated October 27th (filed November 15th), 1926. 1,380 shares taken up. £600 paid, £780 considered as paid. Mortgages and charges, nil.

Prince's Electrical Clocks, Ltd.—Capital, £3,000 in £1 shares. Return dated December 16th, 1926. All shares taken up. £1,000 paid, £2,000 considered as paid. Mortgages and charges, nil.

E. H. Maisner & Co., Ltd.—Capital, £1,000 in £1 shares. Return dated April 5th, 1927. 490 shares taken up. £490 paid. Mortgages and charges, nil.

City Notes.

Electric Supply Corporation, Ltd.

The annual meeting was held last week, Mr. J. G. B. Stone (chairman) presiding. Introducing the report (*vide* ELECTRICAL REVIEW, April 22nd, p. 651), the chairman said that although there was an increase in gross earnings during 1926 the profits, which included dividends on investments, were reduced. The only increase made in the charges was in the case of contracts embodying a scale varying with the cost of coal. The lighting rates were not only not increased, but in some cases were actually reduced. In the smaller towns they were charging the maximum rates authorised by the Orders. Their costs had risen by over £8,000, but the adoption of Diesel engines in certain of their stations saved them from the full effects of the enhanced cost of coal. Generally speaking, the coal stoppage cost them £10,000, of which £6,000 was recovered from the large industrial contracts. Their holding in the Hendon Company was increased by 9,253 bonus shares. The Dumbarton Burgh and County Tramways Co. was passing through a bad period owing to bad trade and unrestricted competition. The North Berwick Company had been purchased by the local authority, and they had received a considerable premium upon their shares. The Hendon and Dawlish Companies were both doing well. The Dalkeith undertaking had been taken out of the accounts. Referring

to the development account, Mr. Stone said that in order to replace those undertakings which had been purchased, or which might be purchased, by local authorities the board had decided to extend the field of operations. Mr. K. A. Scott-Moncrieff (managing director) seconded the motion, and made reference to the Electricity (Supply) Act, 1926, and said that if the scheme matured the company would obtain its electricity in bulk and would be relieved of the responsibility of generating plant. The report and accounts were adopted, and subsequently a resolution was passed for the creation of 500,000 £1 shares, raising the authorised capital to £500,000.

South Wales Power Co., Ltd.

Presiding at the annual meeting on April 26th, the chairman (Mr. W. North Lewis) reminded the shareholders that the company held the bulk of the capital of the South Wales Electric Power Distribution Co. (the Parliamentary Company) and proceeded to refer to the working of the latter company during 1926 (*vide* ELECTRICAL REVIEW, April 22nd, p. 650). He said that the actual output, in spite of the coal stoppage, had only fallen by 14 per cent., but, naturally, generating costs were high. At the commencement of the dispute they had large stocks which obviated the purchase of dear and inferior coal for several months. He claimed that the company had demonstrated its importance in the industrial life of the area. Although South Wales industry was recovering very slowly, the company's output showed a further record; if the rate was maintained there was every reason to hope that it would be possible to pay an ordinary dividend for the current year. The company's plant had been kept up-to-date. They had advanced from 1,500-kW sets to capacities of 16,000 and 18,750 kW, and they hoped during the next few months to place an order for a 25,000-kW set. At the same time their steam plant had been improved, and they were now working with high-pressure, high-temperature boilers with a capacity of 60,000 lb. per hour. That afternoon the Earl of Plymouth was to open the extensions to the power station which had been proceeding for the past four years. The directors intended to continue the improvement and in preparation were asking for an increase in the authorised capital from £850,000 to £1,100,000 and the conversion of certain ordinary shares into ordinary stock. Mr. Lewis said that now that the Electricity Act was on the Statute Book they would do their best to make it a success; they had confidence in the *personnel* of the Electricity Board.

The report and accounts were adopted, and at an extraordinary general meeting which followed the authorised capital was increased.

Indo-European Telegraph Co., Ltd.

In presenting the report for 1926 at the annual meeting on April 28th, Mr. H. L. M. Tritton (chairman), after referring to the successful working during the year, dealt with the question of radio-telegraphy. He said that, although remarkable use had been made of the discoveries in radio transmission, he was convinced that as the telegraphing habit grew, there would still be room for both wired and wireless communication, and, in his opinion, the cable and land-line companies would continue to hold their own. The company had introduced a number of special services which were much appreciated by the public. The difficulties attending the re-opening of the Black Sea cable had not yet been overcome, although no stone had been left unturned to restore direct communication between Odessa and Constantinople. Negotiations had been proceeding with the Turkish authorities, but had not yet reached finality; it was feared, also, that difficulty would be experienced in repairing the fault in the cable. In December last he (the chairman) paid a visit to Moscow, and interviewed the heads of the Russian Government telegraph and telephone services; he was courteously received, and hoped that his visit would prove of mutual benefit. He also went to the company's Odessa headquarters and met members of the British and Russian staffs. The chairman then reviewed the financial results, which were summarised in our last issue (p. 690), and the report and accounts were adopted.

Mexican Light and Power Co., Ltd.

Particulars have been published of a scheme for dealing with the arrears of bond interest and preference dividends. With regard to the 5 per cent. second mortgage bonds, the interest on which is about £750,000 in arrears, it is proposed to allot £7 10s. in cash for each £100 bond and £50 par value of bonds of the same issue. The arrears on the 6 per cent. cumulative income bonds ($3,532,757) will be satisfied by the allotment at par of 10-year unsecured notes bearing no interest but provided for by a sinking fund to the extent of $200,000 every half year. The holders of the 7 per cent. cumulative preference shares (the arrears of dividend on which amount to $5,670,000) are to receive new 4 per cent. cumulative redeemable second preference shares in the proportion of $95 of new shares for each $100 of existing shares. The new preference shares will be redeemed by means of a sinking fund. The board also proposes to convert the ordinary shares into shares of no par value. If the scheme is approved, it is thought that the company will be able to pay the current dividends on the two classes of preference shares and still have a surplus.

Vickers, Ltd.

Speaking at the annual meeting on April 29th, the chairman (General Sir H. A. Lawrence) referred to the losses engendered by the industrial disputes of the past year and to the steps taken by the directors to get rid of unremunerative subsidiary concerns. He said, *inter alia*, that the company's interests in Vickers-Petters, Ltd., had been sold; that company had not given any return for some years, and had involved additional finance. They had closed down the British Lighting and Ignition Co., Ltd., and the sale of the assets had realised more than the written-down book value. The Metropolitan-Vickers Electrical Co., Ltd., continued to progress; the overseas business had shown expansion and the net profit for the year had improved. Metro-Vick Supplies, Ltd., which had not shown the results which should have accrued from that branch of the business, had been reorganised, and now showed good possibilities of development. The chairman denied that there was any intention of amalgamating the company's business with that of Sir W. G. Armstrong, Whitworth & Co., Ltd., but said that conversations had taken place in order to ascertain whether some working arrangement could be made between similar departments of the two companies with a view to more economical production. There was, at present, nothing definite to report.

Chelsea Electricity Supply Co., Ltd.

The annual meeting was held on April 28th. Mr. W. R. Davies (chairman), who presided, in moving the adoption of the report and accounts (ELEC. REV., April 22nd, p. 651), referred to the reorganisation, and said that their dividends in future would be limited to 1s. 9.3d. per share until 1931, and to 1s. 4.8d. per share for the forty years thereafter, unless the reduction of charges below the standard price permitted the payment of more. Allowing for the bonus, the dividends stated represented 14.2 and 11.2 per cent. respectively on the old capital. After referring to the increased expenses of the past year, Mr. Davies said that the cost of electricity would be lower this year, and that would enable them to effect important reductions in their charges to consumers. The benefit of generation at large stations had still to be felt, but he was sure that the policy would be justified and that the consumers would benefit materially. That in turn would lead to an acceleration in the rate of increase of business. The report and accounts were approved and a resolution increasing the directors' remuneration was adopted.

Notting Hill Electric Lighting Co., Ltd.

The report for 1926, which is to be presented at the annual meeting on May 10th, shows a profit of £64,336 and after making various allocations, including interest, sinking fund, income tax, and £1,386 to the staff under the co-partnership scheme, there remains a balance of £29,113. After paying the preference and standard ordinary dividends, there is a balance of £7,594. Referring to the capitalisation of the reserves, the report says that the amount standing to the credit of the special reserve fund for capitalisation is £76,216, and to that will be added the company's share of the free reserves of the Kensington and Notting Hill joint undertaking Until the latter figure has been ascertained it is not proposed to deal with the capitalisation. It is proposed to issue during this year the balance of the preference shares (£56,000). With a view to the simplification of the capital account, it is proposed that the deferred shares shall be merged with the free reserves into ordinary shares, and that the two issues of preference shares shall be consolidated and made cumulative. Meetings of all classes of shareholders will be held after the annual meeting to give effect to these arrangements.

Anglo-American Telegraph Co., Ltd.

The report for the past year states that three quarterly dividends of 15s. per cent. on the ordinary stock, and £1 10s. per cent. on the preferred stock, and final dividends of £1 10s. per cent. on the ordinary stock, £1 10s. per cent. on the preferred stock, and £1 10s. per cent. on the deferred stock have been paid. These payments, together with £52,500 for income tax, absorbed altogether £262,500, being the rent paid by the Western Union Telegraph Company for the year. The balance at credit of revenue account (£72,977) includes £7,352, interest received, and the balance of £65,625 is available for the payment of dividends for the quarter to March 31st, 1927. The directors have decided to apply the accumulated interest above mentioned, amounting to £7,352, to the creation of a capital reserve fund, and to credit that fund with all future interest received. The death of the chairman, Sir Herbert S. Leon, Bt., is recorded. Mr. R. H. Benson has been appointed chairman, and Lord Cochrane of Cults has been elected a director.

Brompton and Kensington Electricity Supply Co., Ltd.

Mr. H. R. Beeton (chairman) presided at the annual meeting on April 28th, and in presenting the report and accounts (ELEC. REV., April 22nd, p. 651), said that, although under the new conditions comparison was difficult, the company had continued to progress. They had not yet been able to enjoy the benefits of consolidated generation, but they had achieved a low relative cost per kWh generated. The general effect of the altered conditions had been to extend their

tenure until 1971. Up to 1931 the dividend on the present ordinary capital would be 8½ per cent. and 7 per cent. thereafter, with the possibility of an additional benefit under the provisions of the sliding scale. The consumers were now even more interested in the progressive development of the undertaking, and he would urge upon them that the more electricity they used the cheaper it would become. They claimed to be pioneers in the provision of electricity for domestic purposes, and their showrooms contained a display of appliances unrivalled among supply companies. They had taken steps to form a staff superannuation fund; that would act as further incentive to the staff to promote the prosperity of the company. The report and accounts were adopted and additional remuneration was voted to the directors for their work in connection with the London Electricity (No. 2) Act, 1925.

West London and Provincial Electric & General Trust, Ltd.

The report for the 15 months ended March 31st last states that the remainder of the capital has been issued. The profit and loss account shows receipts of £14,621, and there is a profit of £10,918, to which is added £2,379 brought forward, making £13,297. It is proposed to pay a final dividend of 5 per cent., making 8 per cent. for the period, to place £2,500 to reserve, and to carry forward £3,059.

The annual meeting was held on April 29th. Mr. H. Kahn presided, and in moving the adoption of the report said that the balance sheet could not be compared with that for the previous period, nor could it be taken as a guide to future accounts. Over 67 per cent. of the company's investments came under the heading of electric light, power and tramways, the total value being £115,624. Included in that were £2,860 debentures of the Chiswick Electricity Supply Corporation, and practically the whole of that company's ordinary capital. Thus the future of the trust was largely bound up with that of the Chiswick Company; the latter had continued to make substantial progress and was an asset of great value.

Calcutta Electric Supply Corporation, Ltd.

The directors' report for 1926 shows that the amount of energy sold by the company rose from 100,587,227 kWh to 108,895,477 kWh. The net revenue, after providing about £137,000 for depreciation and renewals, was £330,240, as against £307,369 in 1925, when £115,000 was allocated to depreciation and renewals. The addition of £33,048 brought forward makes available £363,288, and after providing for debenture interest, preference dividend, &c., it is proposed to transfer £50,000 to reserve, £3,000 to insurance fund, and £1,000 to retiring gratuity fund; a final ordinary dividend of 7 per cent. is recommended, making 12 per cent. for the year, leaving £31,600 to be carried forward. It has been decided to capitalise part of the reserves and to issue 136,671 new ordinary shares to existing shareholders in the ratio of one to ten, fractions being paid in cash. The meeting was to be held on Wednesday last.

Cork Electric Tramways and Lighting Co., Ltd.

The annual meeting was held on April 22nd. Mr. A. R. Monks, who presided, said that owing to the high prices ruling during the strike they paid for their coal supply £14,600 more than they would have paid under their contracts. Of this amount only £4,500 was passed on to consumers, so that the net cost of the coal strike to the company was £10,000. The lighting and power business again showed a satisfactory increase. The Free State Electricity (Supply) Bill, 1927, gave exceedingly wide powers to the Electricity Supply Board which it was proposed to create to control the distribution of electricity in the Free State, and consequently the company's future was rather uncertain. The Electricity Board might desire them to take a bulk supply or it might decide to acquire the undertaking, which in the terms of the Bill they might purchase on the basis of paying a sum equal to the fair value of the undertaking as a going concern.

British Electric Traction Co., Ltd.

The directors propose to issue to ordinary stockholders, in the form of deferred ordinary stock, a portion of the amount standing to the credit of the undivided profits account equal to 10 per cent. on the ordinary stock. The existing ordinary stock will be converted into an 8 per cent. non-cumulative preferred ordinary stock, and the new stock will receive anything which but for the scheme the ordinary stock would have received above 8 per cent. While the preference stockholders remain unaffected, if the scheme is adopted they will receive for the past year an additional 2 per cent., making 8 per cent. for the year.

Stock Exchange Notices.

The undermentioned have been ordered to be officially quoted :—

American Telephone and Telegraph Co.—$13,639,500 capital stock.

Dealings in the following have been specially allowed by the Committee under Rule 159 :—

Ascot District Gas and Electricity.—357 six per cent. preference "E" shares of £10 each, fully paid, Nos. 13,144 to 13,500.

Chiswick Electricity Supply Corporation.—100,000 ordinary shares of £1 each, fully paid, Nos. 1 to 100,000.

Companies Struck off the Register.

The names of the undermentioned companies have been struck off the register and they are thereby dissolved :—

B. Barnett (Electrical Engineers), Ltd.
British Generator Co. (1922), Ltd.
British Homo. Wireless Co., Ltd.
Broadcasting Installations, Ltd.
Eclat Electrical Accessories (Paddington) Co., Ltd.
Electronic Devices, Ltd.
Hull Wireless Co., Ltd.
Prior's Television (Parent) Co., Ltd.
Radio Products, Ltd.
Reynard Electrical Co., Ltd.
Wilmore's Wireless, Ltd.
Wireless Enterprises, Ltd.

Mackay Companies.

The report of this group for 1926 records income and profits from investments of $4,922,811. Operating expenses absorbed $296,640, leaving $4,626,171, to which is added a surplus brought in, making $6,771,513. The dividends required $4,611,111, leaving a surplus of $2,160,402. It is stated that during the past 20 years all extensions have been made from reserves and earnings, and in the last six years no less than $25,000,000 has been spent on capital assets, including Atlantic cables. The Atlantic business continues to expand satisfactorily, but the net profit rises at a lower rate owing to the extended use of the low-rate services. The report shows that the group does not fear the competition of the "beam" system, and places great hope in the development of loaded cables.

Lanarkshire Tramways Co.

This company sustained a further loss on working of £11,568 during the past year; this is attributed to motor-'bus competition, local rates, the general strike, and the coal dispute. Several local authorities have prepared by-laws for the regulation of motor-'buses which, if enforced, should eliminate the loss on the company's services. The local rates are partly based on profits made during the period before motor-'bus competition set in, and the debit for the year in this direction was £6,500; the debit for the current year will be less than £1,000.

Reading Electric Supply Co., Ltd.

The revenue for the past year was £84,156, and the gross profit £33,875 (as compared with £39,329 for 1925). It is proposed to pay a dividend of 8 per cent. on the ordinary shares, as in the preceding year, leaving £2,781 to be carried forward. During the year an issue of £150,000 of 6 per cent. debenture stock was made to enable the balance of the 7½ per cent. debenture stock (£93,400) to be redeemed, and to provide further working capital; the issue was fully subscribed.

Provincial Tramways Co., Ltd.

The net revenue for the past year was £14,675, and to this is added £5,784 brought forward, making £20,459. After providing for debenture interest and sinking fund, there is a balance of £15,115. It is proposed to pay the preference dividend for 1924, leaving two years' dividend in arrears, and to place £6,000 to general reserve (making £32,787), leaving £3,116 to be carried forward. The capital expenditure during the year was £14,343, and it is estimated that £12,000 will be expended during the current year.

Swansea Improvements and Tramways Co.

The revenue for the past year was £137,160 (against £149,986). After meeting all expenses, including £20,000 for renewals, there is a balance of £7,560 (as compared with £13,847 in 1925). A balance of £7,968 brought forward is added, making £15,528. It is proposed to repeat the dividend of 6 per cent. and to carry forward £8,130. The reduction in revenue is, of course, attributable to the general strike and coal dispute.

International Automatic Telephone Co., Ltd.

An extraordinary meeting was held last week, when special resolutions were confirmed authorising the creation of 200,000 preference shares of £1 each; and providing for the cancellation of the option of Messrs. Theodore Gary & Co. upon the 170,338 issued preference shares, substituting an option to subscribe for an equivalent number of new shares at the same price, *viz.*, 21s. 6d. each.

Ever-Ready Co. (Great Britain), Ltd.

The directors recommend a final dividend of 5 per cent. on the preference shares, making the maximum of 10 per cent. for the year. The ordinary shares (including those issued in November last) are to receive a dividend of 25 per cent. The old shares received an interim dividend of 10 per cent.; the total is thus 35 per cent. for the year, as against 25 per cent. last year. The net profit was about £174,500 against £139,500.

Newmarket Electric Light Co., Ltd.

The report, which was presented at the annual meeting on April 25th, showed a net profit of £2,346, plus a balance brought forward of £608, making £2,954. A dividend of 8 per cent. was declared and £829 was carried forward.

New Issues.

County of London Electricity Supply Co., Ltd.—An issue of £4,250,000 of 5 per cent. debenture stock was made this week. The issue price was £96 per cent., and the stock is redeemable in 1972 at par. The stated objects of the issue were:—"To repay the loan from the company's bankers to provide funds for the extension of the Barking power house, and for further capital expenditure in the company's areas inside and outside the Administrative County of London, in order to cope with the developments taking place in every direction."

Rushden and District Electric Supply Co., Ltd.—The directors are offering to existing shareholders or their nominees an issue of 10,664 £1 shares at 24s. per share, in proportion to their holdings. The list closes on May 17th.

Urban Electric Supply Co., Ltd.

The balance of the 1926 net profit and loss account, after providing for debenture interest, &c., is £90,171. To this is added £18,683 brought forward, making £108,854. A total of £1,524 is devoted to the purchase of funded dividend certificates, £35,000 is placed to depreciation reserve, and £15,000 to general reserve. After paying a dividend of 7 per cent. on the ordinary shares, a balance of £19,548 is carried forward. Meeting: May 12th.

Columbia Gas and Electric Corporation.

The gross earnings for the year ended February 28th last were $92,850,286 and the net operating earnings $31,581,455, to which were added miscellaneous receipts of $3,460,444. The net income was $25,693,548. The directors have declared a quarterly dividend of $1.25 per share on the no-par value common stock, payable May 15th.

West Gloucestershire Power Co., Ltd.

The report for the past year shows that in the face of the industrial troubles of the period, the energy sold rose by 364,226 kWh to 7,423,673 kW, and the revenue by £8,363 to £45,760. During the year 50,000 participating preference shares of £1 each were issued, 30,000 of them to existing shareholders at par.

Craigpark Electric Cable Co., Ltd.

Out of the profit for the past year £2,000 is written off for depreciation, and it is proposed to pay a dividend of 7½ per cent. (against 12½ per cent.), leaving £1,585 to be carried forward.

City of Buenos Ayres Tramways (1904), Ltd.

A dividend of 1s. 3d. per share has been declared for the quarter ended March 31st.

German Companies.

The *Concordia Electricity Company*, Dusseldorf, reports net profits of 221,000 marks, against 239,000 marks in 1925, the dividend remaining at 5 per cent.

The report of the *Duisburg Cable Works Company* reports a net profit of 649,000 marks, as compared with 652,000 marks in 1925; the dividend is 8 per cent.

The *Emag Electricity Company*, Frankfort-on-Main, is increasing its dividend from 5 to 6 per cent., the net profit for 1926 having been 68,000 marks, against 53,000 marks.

The *Dr. Paul Meyer Company*, Berlin, reports net profits of 251,000 marks for 1926; the dividend is 6 per cent.

The *Mix and Genest Telephone and Telegraph Works Company*, Berlin, is paying 9 per cent., as against 6 per cent. in 1925. The ordinary share capital is to be raised by 2,500,000 marks to 9,500,000 marks.

The *Company for Electrical Undertakings*, Berlin, has declared a dividend of 10 per cent., as in 1925.

The *German Cable Works Company*, Berlin, reports that the works were well employed in 1926, and although sale prices were low, the value of the turnover was almost 50 per cent. greater than in the previous year. Besides the home contracts, large orders for h.p. and l.p. cables were received from abroad. A dividend of 6 per cent. (as in 1925) has been declared out of net profits of 381,000 marks.

The *Hartmann and Braun Company*, Frankfort-on-Main, states that a perceptible improvement took place in the second half of last year, but the working results could not be considered satisfactory. The net profits amounted to 216,000 marks, as compared with 122,000 marks in 1925, and the dividend is 8 per cent., as against 5 per cent. in 1925.

The *North German Cable Works Company*, Neukoln, reports net profits of 229,000 marks, as against 25,000 marks in 1925, and the dividend is 8 per cent., as against *nil* for 1925.

The *Felten and Guilleaume Carlswerk Company*, Cologne-Mulheim, reports that products last year included 50,000-V cables; and the development of cables for over 100,000 V had so far progressed that it was hoped to be able to introduce them on a large scale shortly. The company also laid last year a telephone and telegraph cable of a length of 165 kilometres between Holland and England, and executed large deliveries of telephone cable for other countries. The accounts show net profits of 4,102,000 marks, as against 4,077,000 marks in 1925, and the dividend is again 6 per cent.

The *Bergmann Electricity Works Company*, Berlin, reports net profits of 3,160,000 marks, as compared with 2,600,000 marks in 1925, and the dividend is 8 per cent., as against 6 per cent. in 1925.

French Companies.

The *Compagnie des Forges et Ateliers de Constructions Electriques de Jeumont* recommends an increase in the dividend from 20 fr. to 27.50 fr. per share for 1926; the *Compagnie Continentale Edison*, from 37.50 fr. to 40 fr.; the *Compagnie Générale de Télégraphie Sans Fil*, from 45 fr. to 50 fr.; the *Compagnie Radio-France*, from 30 fr. to 46.80 fr.; and the *Compagnie Radio-Orient*, from 30 fr. to 35 fr.

The *Société Française des Electrodes*, Lyons, proposes to pay a dividend of 12 per cent. for the past year.

The *Société de Construction Electrique*, Lyons, has decided to distribute 5 fr. per share out of the available surplus of 354,000 fr. for 1926.

The *Compagnie Française Thomson-Houston*, Paris, reports a credit balance of 30,326,000 fr. for 1926, as compared with 11,754,000 fr. in the previous year. It is proposed to apply 18,000,000 fr. to writing down purposes and to carry forward the balance of over twelve millions. If this recommendation is adopted the directors intend to pay a dividend of 20 fr. per share in the middle of this year.

Belgian Companies.

The *Société des Ateliers de Constructions Electriques de Charleroi* reports a net credit balance of 9,065,000 fr. for 1926, as against 7,159,000 fr. It is proposed to pay a dividend at the rate of 25 fr. (10 per cent.) per share as compared with 20 fr. in 1925.

The *Compagnie Générale de Railways et d'Electricité*, Brussels, reports net profits of 10,684,000 fr. for 1926, as compared with 7,945,000 fr. The dividend is 42.50 fr. per ordinary share, as against 40 fr.

The report of the *Société Générale Belge d'Entreprises Electriques* states that the net profit for 1926 was 7,420,000 fr., as against 4,783,000 fr. in 1925. It is proposed to pay a dividend of 60 fr. per share, against 55 fr.

Dutch Company.

The *Nederlandsche Kabelfabriek Maatschappij*, the Hague, reports a net profit of 1,082,204 guilders for the last financial year, as compared with 883,359 guilders in 1925. The dividend on the capital of 2½ million guilders is being increased from 21 to 24 per cent.

Austrian Company.

Brown, Boveri and Company, are paying a dividend of 12 per cent. out of net profits of 550,000 schillings, as compared with 10 per cent. in the previous year.

Stocks and Shares.

MONDAY EVENING.

So long as monetary conditions give encouragement to the idea that there may be a reduction to 4 per cent. in the Bank Rate, so long is it certain that prices of investment stocks will remain what the Stock Exchange terms "good." The lowering of the minimum to 4½ per cent. on April 21st gave the signal for the unloosing of a flood of new issues; many of them of the best class and of substantial extent.

The County of London Electric Supply Company has offered 4½ million pounds of 5 per cent. debenture stock at 96. The stock will be redeemable at 100 in 1972. Ample security, the prospectus shows, exists for the stock and its interest. The latter works out to £5 4s. 2d. per cent. on the money at the issue price of 96. The amount offered is a large one, but the County of London Electric board shows its faith in the public appreciation of the investment by the fact that the underwriting commission mentioned in the prospectus is no more than 1¼ per cent. For more than a year past there has been lively curiosity as to the shape which the long-expected County issue would assume, and occasional bouts of speculation occurred on the circulation of rumours now set at rest by this week's prospectus. No changes have occurred in the company's ordinary and preference shares.

Electric Supply Corporations are a strong market, with a net rise of 1s. 9d. to 32s. ex dividend. London shares are steady. Holders of electricity supply investments are watching with keen interest the anger aroused amongst gas consumers at the remarkable increase in most customers' bills presented for the March quarter. The gas companies' innocent surprise at the protests is observed with a certain twinkle of the eye. One result will infallibly be to turn public attention to electricity for cooking, and the practical exposition of its advantages, dwelt upon in the supplement to last week's ELECTRICAL REVIEW, makes useful propaganda at a moment when gas customers are feeling sore and indignant with their current accounts.

The tendency of investment to look ahead in the purchase of shares in the provincial undertakings is again exemplified in to-day's price-lists. Newcastle-on-Tyne ordinary are 1s. up, Lancashires 6d., and several others have gained the turn.

Urbans have put on 1s. 6d., with a rise to 27s., although the dividend of 7 per cent.—the same as that of a year ago—led to a little disappointment. It had been thought that 8 per cent. might have been declared. Edmundsons at 26s. 9d. have gained a few pence.

Chiswick Electric Supply ordinary are maintained at 53s. 9d., at which price the return on the money is nearly 6 per cent. on the basis of last year's dividend of 16 per cent. This rate was paid also in 1925, following 15 per cent. for 1924 and 12½ per cent. for 1923. Richmond (Surrey) Electric ordinary can be bought at 30s., yielding 6 per cent. on the 1926 dividend of 9 per cent., which compared with 10 per cent. in each of the three preceding years. The reduction last year was due to the effects of the coal strike.

The new County of London 5 per cent. debenture is comparable to London Power 5 per cent. debenture, obtainable at 97½ ex the interest due a month ago. There is a small amount of Llanelly and District 5 per cent. first mortgage debenture on offer at 93, June and December interest, yielding £5 7s. 6d. on the money.

Tokio Electric 6 per cent. sterling bonds have shed two or three points, to 87½, in consequence of the recent financial crisis that disturbed the price of most Japanese securities.

Investment demand is at work amongst the cable stocks and shares. Eastern ordinary, Eastern Extensions and Globes are all better, although Globe preference parted from its gain of a week ago. Indo-Europeans are firm at 45½, the recent meeting producing a good impression. The chairman mentioned the curious fact that as there is no intermediate transmission, the actual time of transit of telegrams was practically nil between London and Karachi. The re-opening of the Black Sea cable, which will restore direct communication between Odessa and Constantinople, has not yet become practicable. Anglo-American Telegraph stocks are both better, on the issue of the report. The feature amongst telephones is a fresh jump in United River Plates, to £9. Bogota Telephones are firmer at 35s., and the company is making such progress as to suggest that the shares are a sound speculative investment of the lock-up order.

It may be noticed that we have removed Cuba Submarines from our weekly price-list. So little public interest is now taken in the shares that no purpose appears to be served by their regular quotation.

Wireless shares are quiet, and with the subsidence of the recent agitation, Marconis are left at 17s. 6d., nor is any fresh attention likely to be directed to them until rumour begins to sport with the dividend possibilities which are expected to materialise in the late autumn. Johnson and Phillips announce a profit for 1926 of £115,100, against £209,900 in 1925, and £162,000 in 1924. The dividend of 7½ per cent. makes 12½ per cent. for the year, against 17½ per cent., of which 7½ per cent. was paid on a smaller capital than the present £600,000. Reserve get nothing this time, and the carry-forward of £82,475 is £8,600 more than was brought in. The price of the shares remains at 47s. 6d., at which the return is 5¼ per cent. on the money. Report has it that the company is now very busy. Ever Ready (Great Britain) has done well, making a profit of £174,500 in the year just ended, an increase of £35,000 over 1925-26, and nearly £70,000 more than in the previous twelve months. The ordinary shares, after a dip to 4¼ sellers, braced up to 4⅜ on the dividend of 25 per cent., making 35 per cent. for the year. The 7 per cent. participating preference, which will receive their full 10 per cent., are quoted at 29s. 6d.

Brazilian Tractions, insatiably bought by Brussels, are up 3¼ at 143 ex dividend. Barcelona Tractions, on the report mentioned last week, are better at 53, and Sidros have gone ahead to 17¼.

Calcutta Electric Supply publishes an excellent report, the figures being extremely good. The previous dividend of 12 per cent. is to be repeated, and a bonus distribution, of one share for every ten shares held, will be made from reserves. The price of the old is better, on the announcement, at 44s. Calcutta Trams stand at 16s. La Plata Trams eased off to 4s. 1½d. The preference, at 20s., are ex the dividend of 1s. 6d. Anglo-Argentines reacted after their brisk advances. On the other hand, the Mexican Utility group is better, and fairly active speculation in Mexican Light preferred shares has raised the price to 108. It is of some interest—if only by way of showing what we can miss—to recall that Brazilian Tractions a year ago were 93, or 50 points below their present level.

Substantial improvements have been secured by the Underground Railway stocks, in which Metropolitans and Metropolitan Districts are included. Districts are 2¼ to the good, and now stand no more than a point below "Mets.," while Underground £1 shares at 18s. 6d. have added another 1s., and occupy the proud position of paying 1⅛ per cent. to a purchaser. That the dividend will be shortly increased is of course taken for granted. Central London ordinary at 71 is 1 higher.

Babcocks have regained the dividend deducted last week from the price, and are 55s. ex dividend. Iron, coal and steel shares are mainly better, upon the improvement shown by the Vickers report and the hopes of better trade in the industry as a whole. The rubber share market is inanimate, and the reduction in the exportable allowance to 60 per cent., which comes into force this month, has been almost ignored so far as the prices of shares are concerned.

Share List of Electrical Companies.

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. 1925.	Dividend. 1926.	Price May 2, 1927.	Rise or fall.	Yield p.c.
Bournemouth and Poole	£1	14	14	58/3xd	—	4 16 3
Brompton Ordinary	£1	10	8⅝	25/6	—	7 5 3
Charing Cross Ordinary	£1	15	8½	25/-	—	5 12 0
do. do. 4½ Pref.	£1	4½	4½	17/-	—	5 6 0
Chelsea	£1	12	8⅝	25/-	—	5 12 0
City of London	£1	15	10	18	—	5 1 10
do. do. 6% Pref.	£1	6	6	22/6	—	5 6 8
Clyde Valley	£1	8	8	31/-	—	5 3 3
County of London	£1	15	7½	28/-	—	5 0 0
do. do. 6% Pref.	£1	6	6	22/6	—	5 6 8
Edmundson's Ordinary	£1	7	8	26/9	+6d.	5 19 8
do. 7% Pref.	£1	6	7	23/6	—	5 19 3
Elec. Supply Corporation	£1	10	10	32/-xd	+1/9	6 5 0
Kensington Ordinary	£1	15	8	25/-	—	5 12 0
Lancs. Light and Power	£1	7½	7½	27/-	+6d.	5 11 1
London Electric	£1	10	8½	24/-	—	5 16 8
do. do. 6% Pref.	£5	6	6	5½	—	5 9 1
Metropolitan	£1	11	8	29/6	—	4 18 3
do. 4½% Pref.	£1	4½	4½	17/-	—	5 2 10
Midland Counties	£1	5½	6	22/6	—	5 6 8
Newcastle-on-Tyne Ordinary	£1	7	5	23/6	+1/-	4 5 1
do. 5% Pref.	£1	5	5	17/6	—	5 14 3
do. 7% Pref.	£1	7	7	24/-	—	5 16 8
Notting Hill 6% Pref.	£10	6	6	10	—	6 0 0
North Met. Elec. 6% Pref.	£1	6	6	22/-xd	+6d.	5 9 1
St. James' and Pall Mall	£5	17½	8	25/6	—	5 9 10
South London	£1	15	8½	25/-	—	5 12 0
South Metropolitan Pref.	£1	7	7	1⅛	—	6 3 0
Urban Ordinary	£1	4	7	27/-	+1/6	5 3 8
do. 6% Pref.	£1	6	6	1⅛xd	+6d.	5 13 0
Westminster Ordinary	£1	15	8½	25/-	—	5 12 0
Whitehall Elec. Invst. 7½% Pref.	£1	7½	7½	20/3	—	7 8 2
Yorkshire Elec.	£1	8	8	29/6	—	5 8 4

HOME RAILS.

Central London Ord. Assented	Stock	4	4	71	+1	5 12 8
Metropolitan	,,	5	3	64	+1½	4 13 9
do. District	,,	3½	3½	53	+2½	5 11 0
Underground Electric	£1	Nil	1½	18/6	+1/-	1 12 5
do. do. Income	Bonds	6	6	102	—	*5 17 6

TELEGRAPHS AND TELEPHONES.

Anglo-Am. Tel. Pref.	Stock	6	6	101xd	+¼	5 19 0
do. Def.	,,	1½	1½	24½	+½	6 3 9
Automatic Telephone	1	3	10	46/3xd	—	4 6 7
Chili Telephone	£5	5	6	6⅞	—	4 18 2
Eastern Extension	£10	10	10	17⅞	+⅛	*5 12 8
Eastern Tel. Ord.	Stock	10	10	175½	+1	*5 14 0
Globe Tel. and T. Ord.	£10	10	10	18⅞	+¼	*5 6 6
do. do. Pref.	£10	6	6	10¼	—⅛	5 10 4
Great Northern Tel.	£10	20	20	27⅞	+⅛	7 4 0
Indo-European	£5	8½	10	46½	—	*5 7 6
Marconi	£1	Nil	Nil	17/6	—	... ...
Marconi-Marine	£1	7½	8⅞	23/9	—	*4 11 5
Oriental Telephone Ord.	£1	12	12	52/6	—	*4 11 5
United R. Plate Tel.	£5	8	8	9	+⅛	*4 9 0
Western Telegraph	£10	10	10	17½	—	*5 16 0

HOME AND FOREIGN TRAMS, &c.

Anglo-Arg. Trams First Pref.	£5	5½	5½	3⅛	—⅛	8 0 0
do. do. 2nd Pref.	£5	6	6	3⅛	—⅛	8 2 8
do. do. 5% Deb.	Stock	5	5	71½	—	7 0 0
British Electric Traction Ord.	,,	8	—	151	+1	5 6 0
do. do. 6% Pref.	,,	6	6	112	+3	5 7 2
Brazil Traction	£100	5	6	143	+2	4 4 0
Brit. Columbia Elec. Rly. Pcs.	Stock	5	5	89½	—	5 11 9
do. do. Preferred	,,	6⅔	6⅔	117½	—	5 6 5
do. do. Deferred	,,	8	—	158	—	*5 1 3
do. do. Deb.	,,	4½	4½	80½	—	5 5 7
London & Sub. Trac. 5% Pref.	£1	Nil	Nil	7/9	—	Nil
London United Tram. Deb.	Stock	4	4	51	—	7 16 10
Mexico Trams, 5% Bonds	—	5	5	75	+1½	6 13 4
Mexican Light Common	£100	Nil	Nil	45	-	Nil
do. Pref.	£100	Nil	Nil	108	+1	Nil
do. 1st Bonds	—	5	5	68½	—	7 6 0
Yorkshire (West Riding)	£1	5	—	8/9	—	... ...

MANUFACTURING COMPANIES.

Babcock & Wilcox	£1	18	18	55/-xd	+1/6	4 14 6
British Aluminium Ord.	£1	12½	10	44/6	—	4 10 0
British Elec. Transformer Pref.	£1	Nil	7	18/3	+3d.	7 13 6
British Insulated Ord.	£1	15	15	70/-	—	4 5 9
Brush Ord.	£1	10	—	28/3	—	7 1 7
Callenders	£1	15	—	3½	—	4 5 9
do. 6½% Pref.	£1	6½	6½	23/9	—	5 9 5
Crompton Ord.	£1	Nil	Nil	10/-	—	... ...
Edison-Swan	4/-	10	10	10/	—	4 0 0
do. 5% Deb.	Stock	5	5	85	—	5 17 8
Electric Construction	£1	10	10	30/	—	6 13 4
Enfield Cable Pref.	£1	7½	7½	1½	—	6 6 4
English Electric	£1	Nil	Nil	10/-	—	... ...
do. do. Pref.	£1	8	—	12/6	—	... ...
Gen. Elec. Pref.	£1	6½	6½	23/6	—	5 10 8
do. Ord.	£1	7½	—	30/6	—	4 18 4
Henley	£1	20	—	90/-	—	4 8 11
do. 4½% Pref.	£5	4½	4½	4½	—	5 6 8
India-Rubber	£1	5	5	1⅛	+⅛	*4 9 0
Johnson & Phillips	£1	17½	12½	2⅜	—	5 5 3
Met.-Vickers Ord.	£1	8	8	37/6	—	5 11 4
do. Pref.	£1	8	8	2⅜	—	6 14 9
Siemens Ord.	£1	7½	—	25/9	—	5 13 2
Telegraph Construction	£2	10	10	28½	—	*4 4 2

* Dividends paid free of Income Tax.

Swiss Foreign Electrical Trade.

THE following statistics, showing the import and export trade of Switzerland in electrical and allied goods in 1926 have been taken from the recently-issued official trade returns. The figures for 1925 have also been given, and notes added of any increases or decreases. The returns show the most important but not all the countries of origin or destination of the goods. An asterisk has been placed where the absence of a figure means not necessarily that there has been no trade but that it has been of comparatively slight importance in the year indicated; in such cases the precise increase or decrease cannot be given.

The sixteen classes of imports which are set out in our list form an aggregate of 21,088,000 fr. for 1926, as compared with 19,940,000 fr. in the preceding year. The most important class, telegraph and telephone apparatus, is the one which showed the greatest rise. The class second in order, unspecified electrical apparatus, showed the greatest decrease. Great Britain's share of the imports of the classes shown fell from 2,831,000 fr. in 1925 to 2,089,000 fr. in 1926; this decrease was accounted for mainly by the decline in our supplies of unspecified electrical apparatus. Switzerland's electrical exports in the fifteen classes shown in the list increased in the aggregate from 73,159,000 fr. in 1925 to 75,030,000 fr. in 1926. There was a small decline in the largest class, *viz.*, dynamo-electric machines and electric transformers of all kinds, and the value of exported meters also fell. The machinery and unspecified apparatus classes showed increases. The share of the United Kingdom in Swiss exports of the classes specified declined from 6,574,000 fr. in 1925 to 5,786,000 fr. in 1926. The figures show that Switzerland has a very substantial balance in her favour in her foreign electrical trade—of the order of 50 million fr. in each of the two past years. This is reflected in the figures of the trade with this country; Switzerland's exports to Great Britain exceeded the imports from this country by about 3,700,000 fr. in each year.

Imports.

	1925. Thous. fr.	1926. Thous. fr.	Inc. or dec. Thous. fr.
Electrical cable, not insulated—			
Total	75	254	+ 179
From Germany	50	87	+ 37
,, France	15	19	+ 4
,, United States	*	146	—
Insulated cable not lead covered or iron armoured—			
Total	500	404	− 96
From Germany	290	302	+ 12
,, France	29	22	− 7
,, Italy	5	4	− 1
,, Belgium	139	57	− 82
,, Holland	4	*	—
,, United Kingdom	29	11	− 18
Cable covered with lead—			
Total	289	389	+ 100
From Germany	287	388	+ 101
Cable covered with lead and iron armoured—			
Total	198	200	+ 2
From Germany	55	195	+ 140
,, Italy	52	1	− 51
,, France	90	3	− 87
Cable insulated with rubber or paper and covered with textiles—			
Total	866	694	− 172
From Germany	355	293	− 62
,, Italy	36	32	− 4
,, France	12	19	+ 7
,, Belgium	304	101	− 203
,, Holland	136	215	+ 79
,, United Kingdom	*	17	—
Cable ditto covered with lead—			
Total	383	520	+ 137
From Germany	215	201	− 14
,, Belgium	44	139	+ 95
,, Italy	13	3	− 10
,, United Kingdom	85	92	+ 7
Dynamo-electric machines and electric transformers—			
Total	1,787	1,957	+ 170
From Germany	1,064	1,011	− 53
,, France	241	387	+ 146
,, Italy	62	92	+ 30
,, United Kingdom	87	157	+ 70
,, United States	103	149	+ 46
,, Belgium	87	25	− 62
,, Holland	*	107	—
Accumulators, batteries, electrodes in combination with rubber or celluloid—			
Total	1,676	1,952	+ 276
From Germany	702	698	− 4
,, Italy	120	86	− 34
,, France	400	419	+ 19
,, United States	71	148	+ 77
,, Austria	95	137	+ 42
,, United Kingdom	262	410	+ 148
Accumulators, &c. (other)—			
Total	224	314	+ 90
From Germany	94	139	+ 45
,, France	57	77	+ 20
Steam engines, cranes, pumps, turbines, &c.—			
Total	475	246	− 229
From Germany	401	157	− 244
,, United Kingdom	48	44	− 4
,, France	5	32	+ 27
,, United States	8	*	—
Electric arc lamps—			
Total (mainly from Germany)	28	26	− 2
Electric incandescent lamps, mounted—			
Total	2,400	2,318	− 82
From Germany	636	613	− 23
,, Austria	184	254	+ 70
,, Holland	1,274	1,072	− 202
,, France	96	139	+ 43
,, Hungary	183	170	− 13
Insulators, mounted—			
Total	119	601	+ 482
From Germany	88	119	+ 31
,, United States	7	294	+ 287
,, Denmark	10	142	+ 132
Electric meters—			
Total	571	626	+ 55
From Germany	504	495	− 9
,, France	38	63	+ 25
Telegraph and telephone apparatus—			
Total	5,923	7,085	+1,162
From Germany	3,342	2,597	− 745
,, United Kingdom	512	351	− 161
,, Sweden	12	119	+ 107
,, France	484	1,161	+ 677
,, Belgium	1,318	2,395	+1,077
,, United States	*	180	—
Electrical apparatus not elsewhere mentioned—			
Total	4,426	3,502	− 924
From Germany	1,913	1,864	− 49
,, France	324	292	− 32
,, United Kingdom	1,808	1,007	− 801
,, United States	57	80	+ 23
,, Holland	*	81	—

Exports.

	1925. Thous. fr.	1926. Thous. fr.	Inc. or dec. Thous. fr.
Dynamo-electric machines and electric transformers of all kinds—			
Total	28,077	26,828	−1,249
To Germany	1,986	2,165	+ 179
,, Austria	688	580	− 108
,, France	4,133	2,221	−1,912
,, Italy	2,313	1,817	− 496
,, Belgium	1,479	872	− 607
,, United Kingdom	1,520	1,243	− 277
,, Egypt	383	267	− 116
,, Spain	2,572	3,044	+ 472
,, British India	223	34	− 189
,, Poland	1,460	904	− 556
,, Rumania	249	755	+ 506
,, Colombia	18	13	− 5
,, Brazil	1,101	1,374	+ 273
,, Argentina	1,074	967	− 107
,, Netherlands	1,170	1,907	+ 737
,, Norway	922	438	− 484
,, Netherlands Indies	311	482	+ 171
,, China	196	231	+ 35
,, Japan	1,570	1,544	− 26
,, Peru	336	162	− 174
,, Australia	654	714	+ 60

	1925. Thous. fr.	1926. Thous. fr.	Inc. or dec. Thous. fr.
Accumulator batteries, electrodes in combination with rubber or celluloid—			
Total	164	207	+ 43
To France	47	121	+ 74
,, Italy	38	10	− 28
,, United Kingdom	1	2	+ 1
,, Poland	1	4	+ 3
,, Germany	30	40	+ 10
Accumulators, &c. (other)—			
Total	145	36	− 109
To France	6	1	− 5
,, Italy	1	*	—
,, United Kingdom	74	1	− 73
,, Brazil	27	3	− 24
,, Spain	*	11	—
,, Turkey	*	4	—
Insulators, mounted—			
Total	109	167	+ 58
To Germany	14	7	− 7
,, France	7	5	− 2
,, Italy	58	91	+ 33
,, Spain	5	19	+ 14
,, United Kingdom	2	1	− 1
,, Norway	*	11	—
,, Argentina	*	16	—
Electric cable, not insulated—			
Total	1,433	1,455	+ 22
,, France	436	847	+ 411
,, Austria	95	35	− 60
,, Italy	33	35	+ 2
,, United Kingdom	660	405	− 255
,, Norway	22	9	− 13
,, Jugo-Slavia	34	*	—
,, Czecho-Slovakia	53	84	+ 31
Insulated cable, not lead covered or iron armoured—			
Total	919	900	− 19
To France	25	111	+ 86
,, United Kingdom	701	521	− 180
,, Denmark	5	*	—
,, Austria	14	11	− 3
,, Sweden	16	5	− 11
,, Hungary	19	46	+ 27
,, Egypt	45	15	− 30
,, Peru	*	4	—
Cable, lead covered—			
Total	16	36	+ 20
To France	10	*	—
,, Rumania	*	10	—
,, Venezuela	*	18	—
Cable, lead-covered and iron armoured—			
Total	35	8	− 27
To France	*	1	—
,, Jugo-Slavia	14	*	—
,, China	10	*	—
,, Brazil	1	*	—
,, Spain	*	4	—
Cable, insulated with rubber or paper and covered with textiles—			
Total	322	201	− 121
To France	40	32	− 8
,, Belgium	172	1	− 171
,, United Kingdom	35	2	− 33
,, Denmark	55	129	+ 74
Electric locomotives—			
Total	2,141	2,354	+ 213
To United Kingdom	156	50	− 106
,, South Africa	*	620	—
,, Japan	490	387	− 103
,, France	1,489	3	−1,486
,, Venezuela	*	445	—
,, Chile	*	848	—
Telegraph and telephone apparatus—			
Total	582	640	+ 58
To France	80	156	+ 76
,, Italy	68	80	+ 12
,, Germany	78	52	− 26
,, Spain	14	11	− 3
,, Dutch East Indies	40	*	—
,, Greece	25	48	+ 23
,, United Kingdom	39	23	− 16
,, Belgium	*	74	—
,, Egypt	*	38	—
Electric incandescent lamps, mounted—			
Total	2,300	1,464	− 836
To Austria	1	—	− 1
,, France	1,050	1,120	+ 70
,, Italy	1,080	269	− 811
,, Portugal	2	10	+ 8
,, Germany	26	5	− 21
,, Norway	19	4	− 15
,, Algeria	1	17	+ 16
,, Greece	36	*	—
,, United Kingdom	23	13	− 10
Steam engines, cranes, pumps, turbines, &c.—			
Total	14,480	17,729	+3,249
To Germany	286	558	+ 272
,, France	2,354	2,078	− 276
,, Belgium	2,170	1,163	−1,007
,, Holland	592	1,419	+ 827
,, British India	344	120	− 224
,, Japan	989	2,850	+1,861
,, United Kingdom	1,560	1,739	+ 179
,, Spain	396	204	− 192
,, China	118	456	+ 338
,, Argentina	1,746	1,829	+ 83
,, Egypt	152	123	− 29
,, Rumania	79	322	+ 243
,, Russia	89	*	—
,, Portugal	17	160	+ 143
,, Colombia	*	3	—
,, Chile	*	49	—
Electric meters—			
Total	12,300	10,543	−1,757
To Germany	565	389	− 176
,, Austria	265	288	+ 23
,, France	2,733	1,579	−1,154
,, Italy	1,119	1,183	+ 64
,, United Kingdom	1,337	1,270	− 67
,, Belgium	1,301	1,227	− 74
,, Spain	1,035	700	− 335
,, Japan	727	212	− 515
,, Netherlands	340	472	+ 132
,, Czecho-Slovakia	565	779	+ 214
,, Australia	467	421	− 46
,, United States	*	501	—
Electrical apparatus not elsewhere mentioned—			
Total	10,136	12,462	+2,326
To Germany	423	674	+ 251
,, Austria	468	938	+ 470
,, France	1,504	1,693	+ 189
,, Italy	658	669	+ 11
,, Belgium	1,408	1,327	− 81
,, Netherlands	401	591	+ 190
,, United Kingdom	466	516	+ 50
,, Spain	833	1,493	+ 660
,, Portugal	168	187	+ 19
,, Norway	101	120	+ 19
,, Czecho-Slovakia	469	818	+ 349
,, Egypt	232	183	− 49
,, China	62	61	− 1
,, Japan	334	181	− 153
,, United States	1,110	886	− 224
,, Argentina	371	477	+ 106
,, Peru	36	112	+ 76
,, Rumania	60	176	+ 116
,, Poland	230	258	+ 28

* Not specified.

The F.B.I. and the Abolition of the D.O.T.

The proposed abolition of the Department of Overseas Trade was considered by the Grand Council of the F.B.I. on April 27th, and resolutions were passed recording the appreciation of the Federation of the valuable services rendered to industry and commerce by the Department and its officers abroad. The Federation considers that the maintenance of many of the functions of the D.O.T. is essential, as their abolition would seriously prejudice industrial and commercial interests, and in particular that it is essential that adequate arrangements should be made for the collection and recording by the Government of information regarding such subjects as foreign tariffs, Customs regulations, &c. The hope was expressed that the services of the commercial diplomatic officers and trade commissioners abroad should be retained. It is realised that there is a need for the strictest economy in Government expenditure, and the F.B.I. offered to help the Government to secure economy with the least possible injury to national interests. The Federation desires to have an early opportunity of laying its views before the Government, and of ascertaining its proposals as to the future of the Department. A committee, chosen from amongst the past presidents of the Federation and members of the Overseas Committee, has been appointed by the Council to carry the matter further.

Modern Stage Lighting.

Some interesting features of the new equipment introduced by Messrs. Holophane, Ltd.

FROM the scientific point of view theatre stage lighting has been sadly neglected in the past, with the result that to-day in many theatres obsolete and crude equipment is still to be found. Some recent developments in this connection should, however, contribute towards remedying this, including the equipment recently introduced by Messrs.

Fig. 1.—Holophane Stage-lighting Batten.

Holophane, Ltd., of which we have obtained the following particulars. This new apparatus is designed to assist, and not neutralise, the artistic efforts of the craftsmen, the required intensity of light being obtained from comparatively only a few lamps used in conjunction with scientifically designed reflectors, which utilise and distribute the light in such a manner that only a very small proportion of the current consumption usually required for the open-type batten is necessary, and which give a good intensity and distribution of light in the direction of the wings.

The equipment is made up in two sizes in standard lengths of 4 ft., the width of the larger size being 11 in. The actual lighting fittings are contained in an iron frame-

Fig. 2.—Special Reflector Unit.

work, fig. 1, about which are folded protecting doors, covering the whole length of each section, which are hinged at the bottom so as to allow them to drop downwards. The doors are fastened at the top by special clips, and can be opened in a few seconds. With the exception of the bottom of the equipment, the whole is enclosed by the doors, which are quite plain, so that the exterior is free from any projections which might get caught in the scenery.

The lampholders are insulated from the metal of the casing, while the insulated cables connecting them to the terminal blocks are additionally protected by insulating beads. They are so constructed that they can be taken out together with the connecting cables without disturbing the supply circuit; alternatively, a circuit can be rewired without touching the holders or the connecting cables.

Fig. 2 shows a special reflector-unit which can be supplied for ensuring that, in the event of a lamp burning out, the distribution of light will remain the same, and so produce no bad effects on the scenery. Similarly, by a combination of these reflectors the bad effects from the failure of a whole circuit or a number of individual lamps can be guarded against.

Holophane clear prismatic glass reflectors, specially designed for the conditions under which they are employed, are installed in the special casings. Fig. 3 shows one of these reflectors, the construction of which, it is claimed, ensures that the rays of light are split up and diffused in such a manner as to avoid the striation effect due to the image of the lamp. Further, it is claimed that the light distribution is such that no matter whether a backcloth is fixed close to a batten or at some distance away, it may be lighted efficiently from top to bottom without assistance from floats or proscenium drops. Each reflector is provided with a special opaque covering shrunk over the outside, fig. 3, which keeps all dust and dirt from the prismatic surface, and at the same time prevents the glassware from being shattered, even if it is violently knocked. The reflector housing is made up of a terminal block, canopy, lampholder, reflector, and a frame at the base for the colour screens. The units can be placed in any part of the batten, and the spacing between them adjusted to suit the requirements of the par-

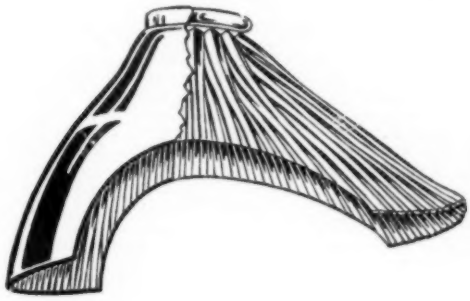


Fig. 3.—Prismatic Glass Reflector.

ticular stage to be illuminated. The parts of each unit may be rapidly dissembled, but it is impossible, it is claimed, for them to come apart of their own accord. Each unit is provided with a simple focusing device which ensures that the best results are obtained from the reflectors and allows of the use, within certain limits, of different sizes of lamps.

It is interesting to note that the advantages and features of the apparatus described above have been embodied in Holophane footlight equipment. The reflectors are built into similar units and housed in a suitable framework. Of course there are certain modifications in this apparatus to meet the necessarily different requirements.

A Severe Lamp Test.

The Edison Swan Electric Co., Ltd., has sent us a copy of a letter it received recently from the Sign Construction Co., Ltd., which indicates how the modern electric lamp will withstand long and hard service. Referring to some Royal Ediswan lamps which were picked out at random from a sign employing about 400 lamps, the Sign Co. mentions that they have been working for approximately 4½ years with an average illumination period of 1,500 hours per annum. The lamps have been used in a horizontal position and subjected to considerable traffic vibration and the usual rough handling during periodical overhauls of the sign. It is calculated that each lamp had been flashed at least 250,000 million times. The lamps had lost nothing of their illumination and there was no appreciable filament sag.

New Electrical Devices, Fittings and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this Section.

A Treble-Scale Miniature Instrument.

Fig. 1 shows a new miniature milliammeter which has been put on the market by MESSRS. A. H. HUNT, LTD., Tunstall Road, Croydon. The normal range of the instrument is, as indicated on the scale, 0-5 mA; but by means of two

Fig. 1.—Miniature Milliammeter.

shunts which are enclosed within the instrument case, and which are controlled by the indicating knob at the top, twice or five times the normal reading range can be obtained.

A Rectifier for Ultra-Violet Apparatus.

A distinct disadvantage to the user of electro-medical apparatus for the production of ultra-violet rays has been the cost of the necessary converting equipment in cases where only an a.c. supply is available. This has to a considerable extent been overcome by means of a new rectifier apparatus which has been put on the market by the MEDICAL SUPPLY ASSOCIATION, LTD., 167-185, Gray's Inn Road, London, W.C.1. The set embodies a 4-cell electrolytic-type rectifier, the cells being connected up in the well-known Gratz method, an auto-transformer, and the necessary switchgear and connecting terminals. The cells are housed in a convenient polished-wood box, to the outside of which is attached the transformer. The apparatus is used in conjunction with a specially

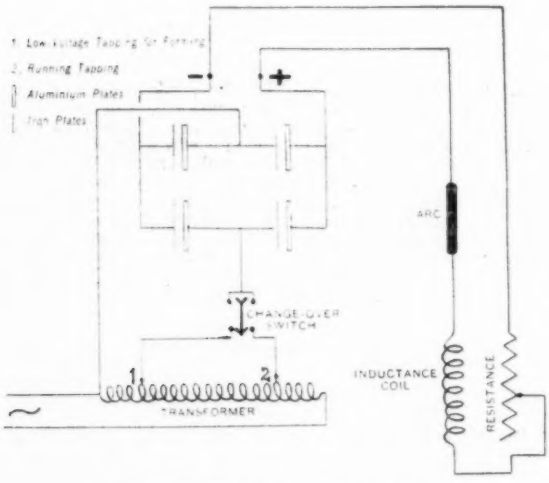


Fig. 2.—Rectifier and Lamp Connections.

designed induction coil, placed in series with the arc, which smoothes out the d.c. wave from the rectifier sufficiently to allow either mercury-vapour lamps or tungsten arcs to work satisfactorily on it. Fig. 2 represents the arrangement of the various parts of the rectifier and the lamp when in use. The function of the auto-transformer is to supply a low pressure for forming the plates before use; the change-over switch provides for the necessary alterations of the connections.

Illuminated Flowers.

Artificial flowers with small electric bulbs concealed in the blossoms are a recent creation, for the decoration of car interiors, of the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2. They are supplied in sprays consisting of either one iris, two roses, three cape-gooseberries, three daffodils, or three fuchsias. The whole of the material and labour employed in the manufacture of these illuminated flowers is British. When unlighted they are claimed to be indistinguishable from natural blossoms. They are supplied with standard Osram steering-pillar lamps. The current consumption is a negligible quantity, being in most cases less than that of one sidelight lamp. The illumination from one spray is claimed to be sufficient to render entering or alighting from the car a safe procedure, and when placed in the rear corners of the saloon, they furnish an adequate reading light.

An Electric Vulcanising Bath.

We have received from MESSRS. ELECTRIC FIRES, LTD., Heatrae Works, Norwich, some particulars of an electric paraffin-wax vulcanising bath, fig. 3, which they have recently placed on the market. It is intended primarily for use in

Fig. 3.—Electric Vulcanising Bath.

mines and large factories where repairs to cables have to be carried out on the job. The apparatus consists essentially of a welded steel trough with three 2-in. steel tubes fitted near the bottom, in which are contained removable heating units. The tubes are covered by a perforated grid to prevent the cables coming into contact with them. A light-steel cover is provided for the bath; this is not hinged as suggested by the illustration, but is entirely removable by means of two handles. The heating elements are controlled by 3-heat switches, which are conveniently housed in a box attached to the side of the apparatus. The internal dimensions of the bath are 5 ft. by 9 in. by 10 in. deep. The maximum loading is 9 kW, and the elements are of equal capacity. It is claimed that on the total loading the wax can be melted and raised to 300 deg. F. in one hour. The bath can be supplied to suit any supply pressure up to 600 V, d.c. or a.c. Cable clamps are provided at each end of the trough.

An Egg-Cleaning Machine.

Another use, this time in the cleaning of eggs, has recently been added to electricity's long list of practical applications. The new method, it is said, has greatly reduced the cost of handling and packing eggs at Petaluma, California, U.S.A., a city frequently referred to as the "Nation's Egg Basket." It is in adding that final touch of perfect cleanliness that electricity has made its latest triumph; formerly this was done by hand, an experienced egg cleaner being able to perform ablutions upon about seven cases of eggs a day. After much experimenting, engineers of the GENERAL ELECTRIC CO. of America applied an electrically operated centrifugal compressor which directs a blast of sand upon a continuous procession of eggs, moving on an automatic conveyor. The blast

of sand removes all extraneous substance immediately, and imparts a fine, even finish to the most untidy egg. The direct results of this innovation in the egg industry have been to increase the speed of cleansing eggs by 80 times, to reduce breakages to a minimum, and to do a much better job—in short, to place cleaner and finer eggs in the kitchens of America.

A Double-Time-Lag Device.

A recent production of Mr. GEORGE ELLISON, Perry Barr, Birmingham, is an adjustable double-time-lag device, figs. 4 and 5, for motor-control circuit breakers. This is designed to overcome the difficulty where the setting is such as to restrain the releases for a time long enough for the motor to run up to speed, but the time is excessively long on ordinary overloads. The apparatus is of the ordinary oil-dash-pot type, but has a by-pass valve fitted in position. The valve closes under the relatively heavy pull caused by the motor-starting current, and this action has the effect of increasing the time of retardation long enough for the motor to run up to speed. When the heavy starting current has subsided, the valve

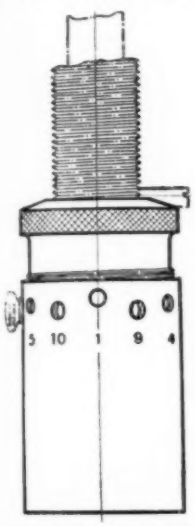


Fig. 4.—Double-Time-Lag Device.

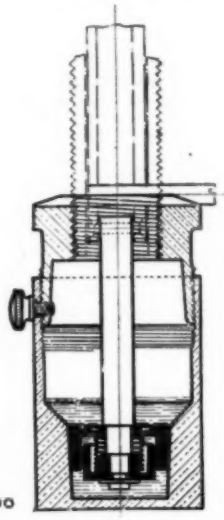


Fig. 5.—Sectional View.

in the piston opens, when the piston is able to rise in a reasonably short time on normal overloads. As the lag has an inverse time element both during starting and running, it releases almost instantaneously on short circuit under both conditions. The device should prove useful on circuit breakers protecting coal cutters, where peaks occur of the magnitude of starting currents, but the breaker must not trip unless the excessive load is sustained. A number of different settings permit a wide range of retardation to be obtained, a screw being provided to lock the cylinder in any desired setting.

An Electric Bathroom Fire.

The accompanying illustration, fig. 6, is of the "Xcel" bathroom fire, a recent introduction of MESSRS. SIEMENS AND ENGLISH ELECTRIC LAMP CO., LTD., 38-39, Upper Thames

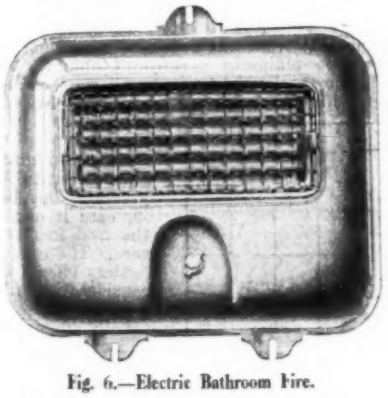


Fig. 6.—Electric Bathroom Fire.

Street, London, E.C.4. It has been designed in response to the demand for a low-consumption fire for use in the bathroom, corridors, and so on. The body is of clean cast-iron, finished in porcelain ivory enamel, and the casing is washable. The switch is sunk into a recess, with only the porcelain knob projecting. The element is of the maker's standard H607 type, and is protected by a neat guard. Suitable lugs provide for wall fixing, and small projecting pieces keep the fire from the wall. An earthing screw is provided. The loading is 750 W.

Junior Institution of Engineers.

Annual Dinner.

THE annual dinner of the Junior Institution of Engineers was held at the Monico Restaurant, London, on April 26th, when Engineer Vice-Admiral Sir Robert B. Dixon, K.C.B., president of the Institution, took the chair.

Following the honouring of the loyal toast, Brig.-Gen. P. R. C. GROVES, C.B., proposed "The Institution." He referred to the backwardness of this country in developing aviation, and criticised the policy adopted of waiting for a more reliable and economical form of engine. He believed it would be right in this country to subsidise research as was done in other countries. Where an air line had been established along the West Coast of Australia the population had been doubled. Aviation would assist to distribute our population, and as it was developed it would increase the demands on other forms of transport. Scepticism was the greatest barrier to development; it had been to every form of transport. He looked forward to the time when there would be an engineering department in the Air Force, having a trained engineer at its head with a seat on the Council. One of the roots of backwardness had been neglect of the engineering side.

In reply, Mr. R. L. KIRLEW, chairman of the Institution, said that the members of the Institution were associated with all branches of engineering, and were alive to their own possibilities. They would endeavour to solve the difficulties of the Air Ministry. The membership of the Institution was approaching 1,700, and the applications were increasing. The financial position was also good, and they were going ahead.

Mr. H. T. TIZARD, C.B., proposed "The Engineering Industry." He said the engineer was always to the fore in the battle of progress. The hard part of the work often began after the laboratory research was done. At no time was the need for the engineer greater than at present, and at no time were the opportunities greater. The motor cycle and wireless were proving incentives, and great educational work was going on in those directions. Referring to the engineering work of the Navy, he said that Sir R. Dixon had the duty of applying progress to satisfy the exacting demands of the Service; perhaps, if we knew the results achieved, we would pay the taxes more readily.

Sir R. DIXON, responding, said that the engineering industry was passing through an unparalleled period of depression which must soon pass away. One good effect of such a depression was that it showed up the faults and where economies could be effected. The training of engineers and skilled mechanics was of the utmost importance to this country. The status of the engineer depended on his general education. A good general education broadened the view of the engineer and opposed the somewhat narrowing tendency of the purely technical training. It was difficult at present to get apprentices for mechanics; it was necessary to encourage a good class of apprentice in the skilled trades. Engineering in the past had been largely a matter of rule of thumb, but now a technical education was necessary, and also a knowledge of physics, chemistry and metallurgy. Research work was better provided for in other countries, with the result that inventions of British origin were often developed and exploited in other countries. Industry would not prosper without proper co-ordination between employer and employed, and every effort should be made to dissipate any misunderstanding between the parties. Once distrust was overcome the revival of the engineering industry would be remarkably quick.

In proposing "Our Guests," Mr. H. P. WRIGHT, vice-chairman, warmly welcomed the visitors present, and the toast was responded to by Sir Henry Fowler, K.B.E., president of the Institution of Mechanical Engineers, and Sir Murdoch Macdonald, K.C.M.G., president-elect of the Institution. Sir HENRY said that the Junior Institution was giving the engineer the opportunity to express himself. The whole country was depending upon the engineer who was materially concerned with transport. Sir MURDOCH said that in the political world matters of engineering were constantly turning up, and members with interest in the engineering industry should be in the House.

Mr. W. M. HURRELL, vice-chairman, proposed "The Chairman," commenting on the success of the evening, which was due largely to Sir R. Dixon.

In his reply Sir ROBERT paid a tribute to Mr. Riddell, the secretary, from whom he had received great help.

Mr. RIDDELL replied, and commented on the existing comradeship in the Institution ranks.

Sir HENRY FOWLER proposed "Our Hosts," and this was supported by Capt. W. C. Watts, Naval Attaché, American Embassy. Capt. WATTS said that engineering on each side of the Atlantic would progress together. There would be a great impetus to the industry within the next few years.

Mr. W. A. TOOKEY replied to the toast.

Selected artistes rendered items between the speeches, adding to the general cheeriness of the evening.

Economic Value of Increased Steam Pressure.

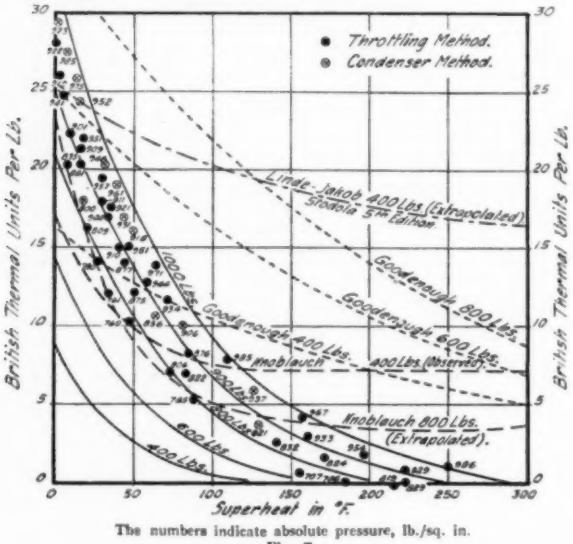
Some results of investigations on the effects of steam-pressure increase on operation and plant efficiencies and costs, with considerations on the selection of particular pressures.

By H. L. GUY.

(*Abstract of a Paper read before the* NORTH-WESTERN BRANCH *of the* INSTITUTION OF MECHANICAL ENGINEERS.)

(*Concluded from page* 699.)

In his last report, Prof. Callendar carried the work up to a pressure of 1,000 lb./sq. in., and observations have since been made up to nearly 2,000 lb. Fig. 7 shows the difference between the observed total heat of steam and that given in Callendar's tables, the latter value being the greater. Prof. Callendar has suggested that the discrepancy may be due to the lag which takes place in his experimental apparatus as the steam is rapidly heated in the superheater. It is questionable whether the actual conditions met with in the operation of power plant are not identical with those of Prof. Callendar's experiments. In all probability such modification in the estimates of thermal efficiency as may be necessary when the experimental work has been completed will probably be of such a nature as to slightly decrease the gains to be expected from increased pressure.



The numbers indicate absolute pressure, lb./sq. in.

Fig. 7.

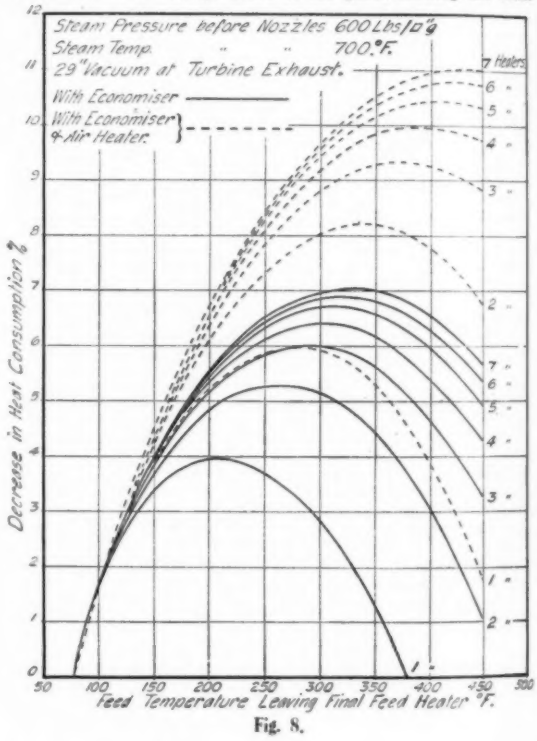

Steam Pressure before Nozzles 600 Lbs/□"
Steam Temp. " " 700.°F.
29" Vacuum at Turbine Exhaust.
With Economiser
With Economiser & Air Heater.
7 Heaters
Decrease in Heat Consumption %
Feed Temperature Leaving Final Feed Heater °F.

Fig. 8.

In order to arrive at the effect on thermal efficiency of the use of regenerative feed heating, several pressures from 200 lb. to 2,000 lb./sq. in. were chosen, and an investigation made from which a series of curves of the type shown in fig. 8 were deduced for turbines designed for 600 lb. working. It was assumed that the total temperature rise was equally divided between the feed heaters, that the feed water leaving any heater reached a temperature 10 deg. F. less than the temperature of the steam supplied to that heater, that the mechanical efficiency of the turbine was 98 per cent., and that the radiation coefficient was 1.05. The full-line curves hold for a boiler plant having an economiser, but no air heater; and those in dotted lines apply to a boiler plant fitted with both an economiser and an air heater, the latter being so proportioned that as the temperature of the gases leaving the economiser increases, it transmits sufficient additional heat to the incoming air to maintain a constant chimney loss. From such curves the results shown in fig. 9 were obtained for an installation with from one to seven feed heaters and an economiser, but no air heaters. The decrease in heat consumption is continuous with increasing pressure, but the rate of increase is most rapid for the first increase in pressure. The number of feed heaters chosen for further consideration, *i.e.*, four, is perhaps more than is usually adopted at present. A constant number of feed heaters has been chosen in spite of the rather smaller gain in efficiency at lower pressures resulting from the addition of the fourth heater, because its inclusion is equally justified when the increasing cost with increasing pressure of incorporating such a feed heater into the system is taken into account. In fig. 10 the quantity of heat supplied per lb. of steam from each main source is plotted for a system employing four feed heaters but no air heater.

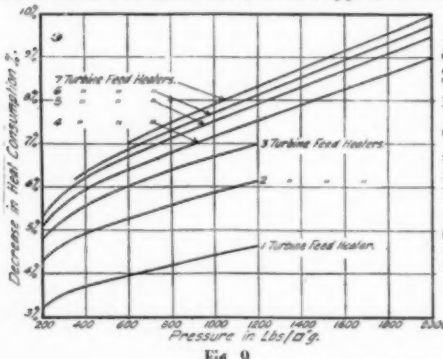


Fig. 9.

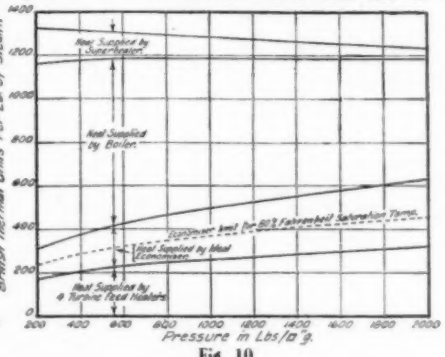

Heat Supplied by Superheater.
Heat Supplied by Boiler.
Heat Supplied by Heat Economiser.
Heat Supplied by 4 Turbine Feed Heaters.
British Thermal Units Per Lb. of Steam.
Pressure in Lbs/□"g.

Fig. 10.

700 deg. F., 29-in. vac.

If the temperature of the water leaving the economiser is limited to 80 per cent. of the saturated steam temperature, the maximum quantity of heat supplied is given by the intercept between the dotted line and that giving the heat supplied by the turbine feed heaters. The line corresponding to the "ideal economiser" shows the limiting economiser input if the water can be raised to boiling temperature.

Figs. 11 and 12 show the corresponding curves for a system in which the boilers are equipped with both economisers and air heaters. The addition of the air heater increases the improvement in heat consumption resulting from regenerative feed heating at approximately 50 per cent. The distribution of the heat input to the steam, fig. 12, emphasises the decreased range of usefulness of the economiser. If the limitation

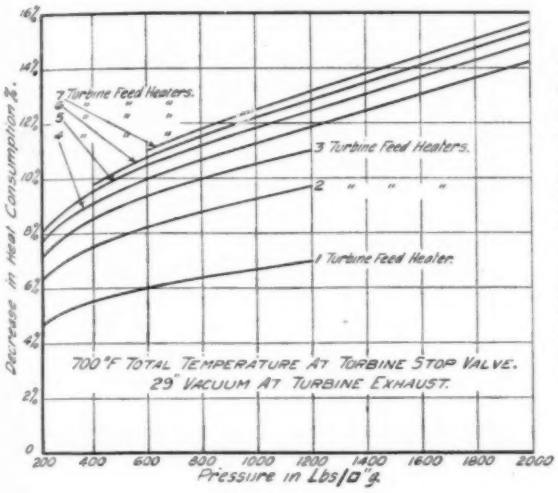

Decrease in Heat Consumption %.
7 Turbine Feed Heaters.
3 Turbine Feed Heaters.
2 " " "
1 Turbine Feed Heater.
700°F Total Temperature at Turbine Stop Valve.
29" Vacuum at Turbine Exhaust.
Pressure in Lbs/□"g.

Fig. 11.

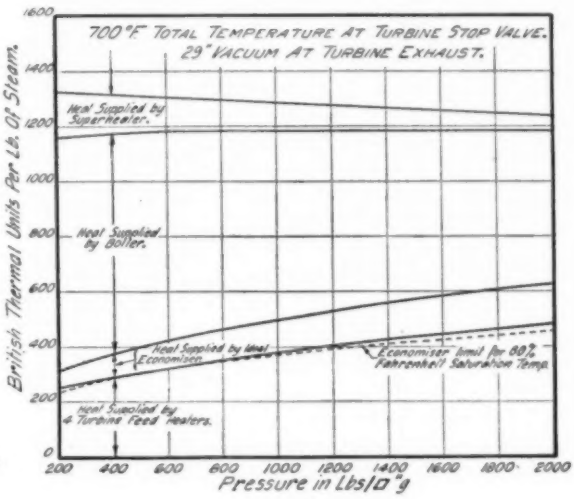

700°F Total Temperature at Turbine Stop Valve.
29" Vacuum at Turbine Exhaust.
British Thermal Units Per Lb. Of Steam.
Heat Supplied by Superheater.
Heat Supplied by Boiler.
Heat Supplied by Heat Economiser.
Economiser limit for 80% Fahrenheit Saturation Temp.
Heat Supplied by 4 Turbine Feed Heaters.
Pressure in Lbs/□"g.

Fig. 12.

of the maximum temperature of water leaving the economiser is still imposed, its range of usefulness practically disappears, but if water can be heated up to the saturation temperature, an important sphere of usefulness is still available to it; as otherwise the amount of heat to be absorbed in the air heater may prove to result in too high an air temperature for comfortable working.

The heat dissipation per pound of steam for an installation incorporating four feed heaters, economisers and air heaters is shown in fig. 13. These figures relate to a pound of steam and not to the steam required per kW generated. Consequently the diminishing proportion shown of heat converted into work is not indicative of decreasing efficiency, because the heat supplied to the steam per kW by the fuel is itself continuously decreasing, as has been shown in fig. 3. When feed heating

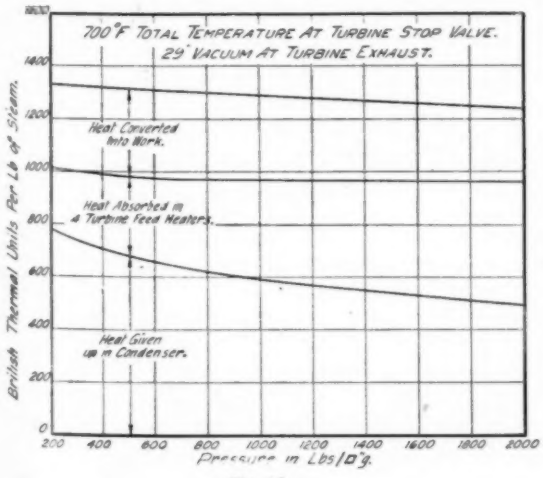

700°F Total Temperature at Turbine Stop Valve.
29" Vacuum at Turbine Exhaust.
British Thermal Units Per Lb. of Steam.
Heat Converted into Work.
Heat Absorbed in 4 Turbine Feed Heaters.
Heat Given up in Condenser.
Pressure in Lbs/□"g.

Fig. 13.

is carried out to the extent indicated, the proportions of the steam passages in different parts of the machine are very materially modified. Relatively to a turbine designed without feed heating, the steam quantity entering the first stages has to be very considerably increased to compensate for lost work capacity of the steam diverted to the various heaters. The areas through the blading in the early stages must therefore be increased on this account. The fact that a large proportion of the total steam is diverted to feed heaters naturally results in the blade areas in the final stage of the machine being substantially reduced.

Fig. 14 shows for various initial pressures how the blade proportion of turbines designed for four stage feed heating should compare with those of turbines designed without feed heating. Consider the blading areas of a 20,000-kW turbine designed for an initial pressure of 1,200 lb./sq. in. with four feed heaters. Then, compared with one designed without feed heaters, it will be built up as follows:—The first ¼ will have blading appropriate to 25,000 kW, the next ¼ appropriate to 22,500 kW, and the next ¼ to 20,000 kW: the following ¼ will have blading appropriate to 18,000 kW, and the final ¼ to 16,000 kW.

The magnitude of the difference is such that it is obvious that the conditions of steam flow in a turbine having blading proportioned on the basis that the feed heaters are in operation will be profoundly modified when it is operated with the feed heaters out of commission, and *vice-versa*. As such modifications in the steam flow conditions would result in some loss of efficiency, the turbine should be designed for the internal conditions holding when the feed heaters are in operation. Estimates of steam consumption with the feed heaters out of commission must be given with reserve.

When considering the influence of resuperheating on thermal efficiency, a change in the total temperature of from 700 to 750 deg. F. was made. This involved the use of plant designed for 800 deg. F. In addition to the assumptions common to the former investigations, a pressure loss in the resuperheater and its connections of 5 per cent. was postulated, but no allowance was made for loss due to radiation to and from the resuperheater. Fig. 15 shows the way in which this affected the thermal efficiency at different pressures. The chain dotted curves were obtained by making a wetness correction at the

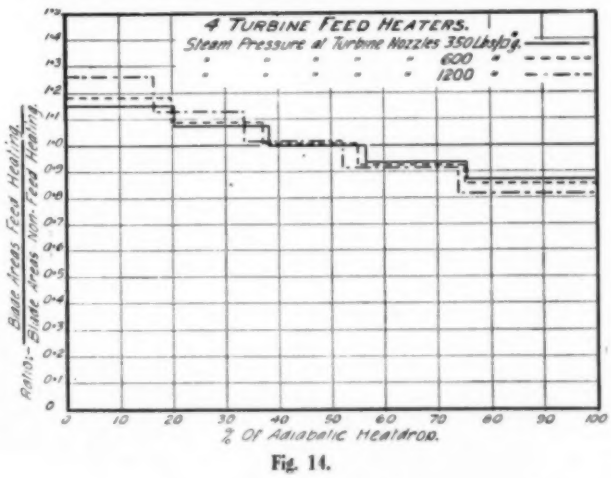

4 Turbine Feed Heaters.
Steam Pressure at Turbine Nozzles 350 Lbs/□"g.
" " " " " 600 "
" " " " " 1200 "
Ratio:- Blade Areas Feed Heating / Blade Areas Non-Feed Heating.
% Of Adiabatic Heat Drop.

Fig. 14.

rate of 1 per cent. loss in efficiency for 1 per cent. mean wetness in the stage concerned. The variation of the proportion of the complete expansion which should precede admission to the resuperheater is depicted in the upper portion of fig. 16, while in the lower part the maximum gain in thermal efficiency resulting from resuperheating is shown. The gain in thermal efficiency resulting from resuperheating, if the full wetness correction is made, is more than one-third greater at 2,000 than at 200 lb./sq. in. The gain at the higher pressure is only one-quarter of that at the lower pressure if this correction is omitted. While many tests have shown that the

usual rate of correction for wetness gives results in conformity with experience with normal h.p. condensing turbines, such experience as has been accumulated on resuperheating installations to date indicates results not in conformity with the predictions on this basis. Judging by the results at present available, the gain due to resuperheating does not exceed the mean estimated on the two bases under discussion. The dotted line shows the locus of this mean.

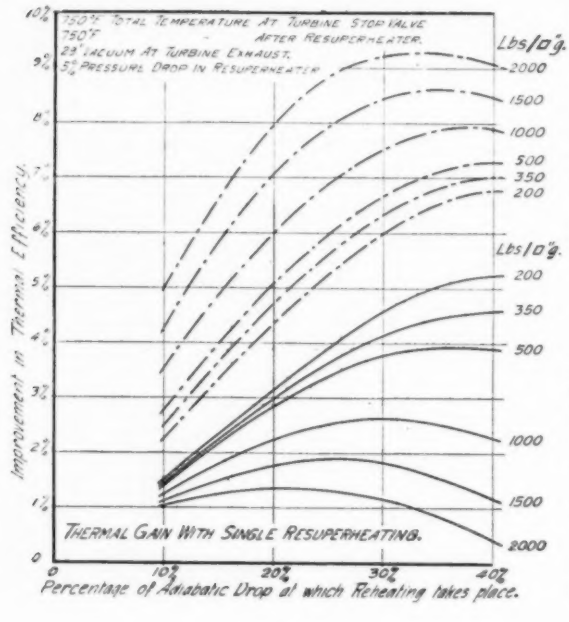


Fig. 15.

There is still a possibility that the resort to resuperheating may be imperative if high pressures are adopted. With the conditions assumed, but without resuperheating, the quantity of water present in the steam in the lower stages of expansion increases very rapidly with the initial pressure. With an initial pressure of 200 lb./sq. in. the fraction of the original steam which is water on leaving the last row of blades is 9.5 per cent.; at 600 lb. this rises to 15.25 per cent., and at 1,200 lb. reaches 20.3 per cent. In a turbine loaded at 40,000 kW, with steam at 1,200 lb./sq. in. initial pressure—assuming that the conditions are stabilised from stage to stage—over 33 tons of water per hour are passed through the last blade. It

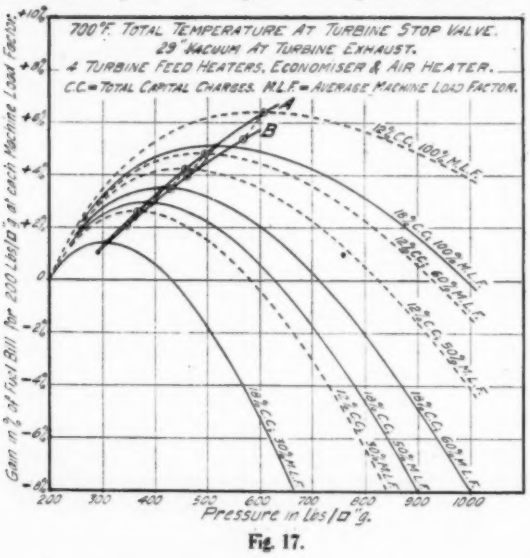

700° F. Total Temperature at Turbine Stop Valve.
29" Vacuum at Turbine Exhaust.
4 Turbine Feed Heaters, Economiser & Air Heater.
C.C.=Total Capital Charges. M.L.F.=Average Machine Load Factor.
A
B
12% C.C. 100% M.L.F.
18% C.C. 100% M.L.F.
12% C.C. 60% M.L.F.
12% C.C. 80% M.L.F.
18% C.C. 80% M.L.F.
12% C.C. 30% M.L.F.
18% C.C. 30% M.L.F.
18% C.C. 60% M.L.F.
Gain in % of Fuel Bill for 200 Lbs/□" at each Machine Load Factor.
Pressure in Lbs/□"g.

Fig. 17.

has still to be proved by experience whether at pressures as high as 500 lb./sq. in. the erosion which may result from such conditions will set a term to the useful life of the blading shorter than that usual with more moderate conditions.

Consideration must be given to the financial advantages likely to result from its adoption. Statistics were carefully compiled co-ordinating cost of plant with the variations resulting from increased pressure in the type of plant herein dealt with. The average mean temperature difference in the four feed heaters is 1.92 times that in the condenser for the 200-lb. installation, the figure rising to 2.46 at 1,000 lb. The mean cost of feed-heater surface per square foot in the latter case is 2.5 times that of the condenser surface.

While the total kW cost of the condenser plant decreases with the initial pressure, that of the feed heaters increases so that the combined cost at first decreases slightly, then takes an upward trend. The cost of the turbines themselves continuously increases with pressure, so does the combined cost of

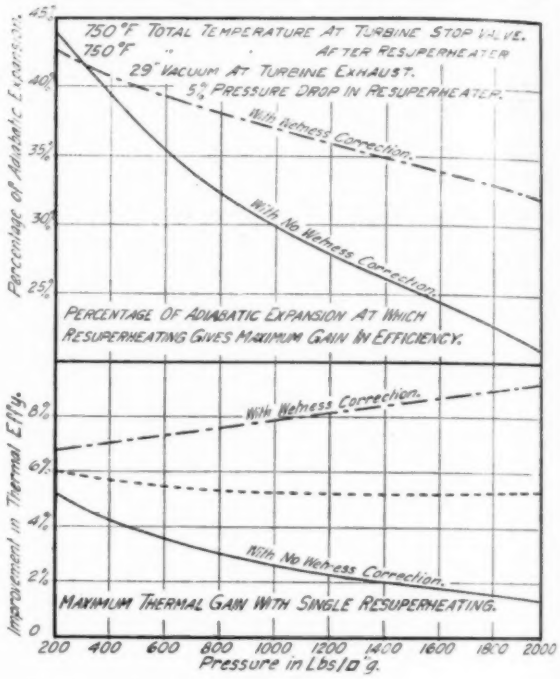

750° F. Total Temperature at Turbine Stop Valve.
750° F. " After Resuperheater
29" Vacuum at Turbine Exhaust.
5% Pressure Drop in Resuperheater.
With Wetness Correction.
With No Wetness Correction.
Percentage of Adiabatic Expansion.
Percentage of Adiabatic Expansion at which Resuperheating Gives Maximum Gain in Efficiency.
With Wetness Correction.
With No Wetness Correction.
Improvement in Thermal Effy.
Maximum Thermal Gain With Single Resuperheating.
Pressure in Lbs/□"g.

Fig. 16

the boilers, economisers and preheaters. On the other hand, the cost of the boiler house decreases. The total increased capital cost per kW installed at economic rating was found to be not less than that given in the following:—

TABLE III.

Pressure—lb./sq. in. g.	200	300	400	500	600	700	800	900	1,000
Increased cost per kW.	£0	0·158	0·359	0·600	0·884	1·211	1·579	1·990	2·44

The costs above 800 lb./sq. in. were obtained by extrapolation.

In order to assess the annual value of the fuel savings, coal was valued at 15s. per 11,500 B.th.u., and the turbine thermodynamic efficiency at 200 lb./sq. in. g. was taken as 80 per cent. The generator and boiler efficiencies are assumed to be 96 per cent. and 84 per cent., respectively, at economic load. From this basis fig. 17 was obtained, showing the saving expressed as a percentage of the fuel bill at certain constant load factors and for two specified rates of capital charges. The

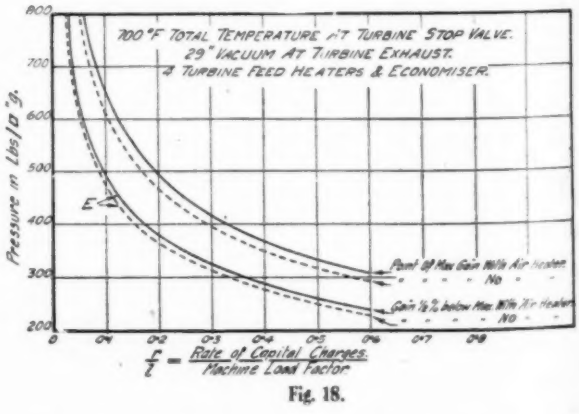

700° F. Total Temperature at Turbine Stop Valve.
29" Vacuum at Turbine Exhaust.
4 Turbine Feed Heaters & Economiser.
E
Point of Max. Gain With Air Heater
No
Gain ½% below Max. With Air Heater
No
Pressure in Lbs/□"g.
f = Rate of Capital Charges / Machine Load Factor

Fig. 18.

12 per cent. rate can be considered as made up of 5 per cent. rate of interest, 5 per cent. depreciation, and 2 per cent. maintenance. With the 18 per cent. rate these charges would probably be 6 per cent., 7 per cent., and 5 per cent., respectively. In any one year the machine load factor is necessarily less than the station load factor.

The locus of the maximum points shown by curve A was checked by arriving at the expressions which corresponded with the ascertained capital cost per kW installed, and the annual fuel saving, thus obtaining the net saving, and differentiating.

The expressions were found to be as follows:—
Net saving in pounds sterling per annum=

$$l\{0{\cdot}610 - [189{\cdot}(p + 110)]\} - r[(2{\cdot}11/10^6)\,p + (5{\cdot}22/10^4)\,p - 0{\cdot}1888] = lv - rc.$$

Where l=machine load factor,
p=pressure adopted in lb./sq. in. g.,
r=rate of capital charges,
v=annual kW value of fuel saved at 100 per cent. load factor, and
c=additional capital cost per kW.

The curves in fig. 18 co-ordinate the pressures corresponding to maximum return on additional investment with the ratio r/l. The net annual gains for other costs of fuel can be obtained by making use of the relation that the gain is constant if the price of fuel multiplied by the load factor is constant. Thus, the curve in fig. 17 relating to coal at 15s. per 11,500 B.th.u. and 100 per cent. load factor holds also for coal at 30s. per 11,500 B.th.u. if the load factor is 50 per cent. Curve A gives the locus of the maxima for installations which include an air heater and economiser, whereas curve B gives the corresponding points if the air heater is omitted. From fig. 17 it will be found that the pressures at which the maximum return is possible vary with the load factors as follows:—

TABLE IV.

	Rate of capital charges.	Load factor 100%	60%	50%	30%
With air heater ...	12%	606	495	459	367
Without air heater	12%	575	466	433	350
With air heater ...	18%	516	417	385	306
Without air heater	18%	477	396	366	293

Special Motor-Generators.

Recent Developments by Messrs. Bull Motors, Ltd., in the production of High-Frequency Machines.

PROGRESS in wireless telegraphy and telephony has made some very exacting demands upon the technical resources of those firms which have been courageous enough to keep pace with the times by developing the special generating plant that is continually being called for by radio

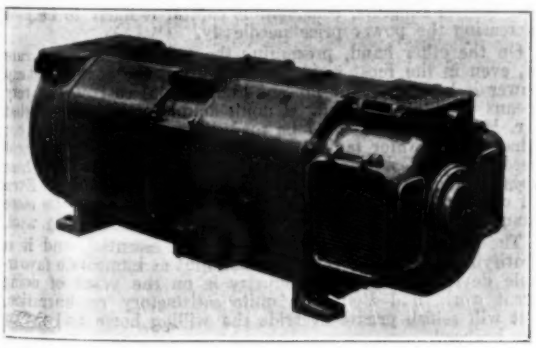


Fig. 1.—Ship's Motor-Generator.

engineers. Included among such firms are Messrs. Bull Motors, Ltd., from whom we have received the following particulars concerning special plant which they have produced.

Fig. 1 shows one of a number of special motor-generators which have been supplied for ship's wireless sets. One section of the double armature, fig. 3, carries the motor winding and also an auxiliary generator winding for supplying 275 W at 25 V for filament heating. The other or generator armature is wound so as to give 0.5 A at 2,400 V d.c., and is fitted with a special h.p. commutator of maximum possible diameter. The set revolves at 3,000 r.p.m., and the h.p. end, which is claimed to be as sparkless as any high-class industrial motor, has been subjected to a flash test of 5,000 V a.c. to earth. Similar tests are in construction for 3,000 volts d.c.

Fig. 2 shows a special 1,000-cycle, single-phase, 110-V, 500-W alternator, having 32 poles, coupled to a d.c. motor revolving at 3,750 r.p.m., the inherent voltage regulation of the alternator from no load to full load being 8 per cent. at 0.8 power factor—a satisfactory achievement when one considers the intricate problems involved in designing a.c. plant for frequencies of the order given. In spite of the high frequency, the overall efficiency at full load is claimed to be 52.1 per cent. The alternator is designed with a rotating field system and an unexpected difficulty was encountered due to the very high windage loss. This was greatly reduced, however, by suitably modifying the outline of the rotor, with a resulting increase of 8 per cent. in efficiency. Very careful attention is given to the design of the rotor poles in this type of machine, as with so many poles in a small diameter flux leakage is a serious matter, and the least departure from correct design may so increase the leakage as to prevent the alternator

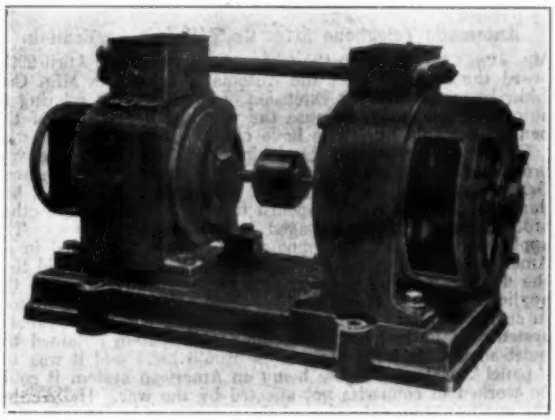


Fig. 2.—1,000-cycle Alternator.

developing its full designed voltage, in spite of the fact that the stator flux density has to be extremely low in order to avoid excessive iron losses.

In the design of the former sets every effort was made to eliminate commutator ripple, and in the latest models this is claimed to have been fully achieved. Similar "Bull" motor generators are in use for heating the filaments of high-power wireless transmission valves.

Fig. 3.—Special Armature for Fig. 1.

Legal.

Shocks from an Electric Drill.

AT Haslingden recently, Messrs. F. S. Scott, Laneside Foundry, were ordered to pay costs for a breach of the Workshops Act. The proceedings arose from an accident at the firm's works when two men received serious shocks whilst using a portable electric drill. The Factory Inspector said that the energy was obtained from an ordinary lampholder. A flexible wire was used whereas there should have been a heavy c.t.s. cable, and metallic connector. Cotton-coated flexible cable and ordinary connectors were used, and the shocks were due to the insulation being bared by a connector. Defendants had now adopted proper connectors and cable.

Electric Light Plant Dispute.

BEFORE Mr. Justice Tomlin, in the Chancery Division, on April 27th, Mr. R. W. P. Dawson, engineer, claimed an injunction restraining the Effingham Estates Co., Ltd., from trespassing in rooms which he said had been leased to him, an order on them to block up the entrance which they had made, and also to remove the electric light plant, and damages for loss alleged to have been sustained by his being unable to use the space occupied by the plant.

Mr. ALEXANDER GRANT, K.C. for the plaintiff, said that the defendants suggested originally that he had agreed to buy the

plant. It was true that each party appointed a valuer to fix a price, but they could not agree, and there was no sale. Neither the plaintiff nor the defendants wanted the plant. What the plaintiff complained of was that the defendants were using the plant for their own premises. When he told them that they must take it away they broke into the rooms and worked it for themselves.

His Lordship considered the case a trivial one, and after lengthy negotiations, following this hint, the parties came to a settlement. His Lordship said he would make an order staying the proceedings on the terms agreed with liberty to mention it to him at any time when a formal minute had been drawn up and signed.

Automatic Telephone Mfg. Co.'s Patent Application.

MR. JUSTICE TOMLIN, in the Chancery Division, on April 29th, heard the application of the Automatic Telephone Mfg. Co., Ltd., Liverpool, for the extension of three patents relating to automatic telephony, because the war had deprived it of the benefit it would otherwise have obtained from them.

Giving judgment, his Lordship said that before the war broke out the company received orders from the Postmaster-General to install its "Director" system in many towns, but during the war it was compelled to refuse to undertake other orders because it was engaged in making munitions. The application, he said, was opposed by persons interested in an American system called the "panel" system. They said that the delay caused by the war was really an advantage to the applicants because it had enabled them to develop their system in such a manner as to compete successfully with the "panel" system. If he had had to decide which system obtained the most advantage from the war he would have said it was the "panel" system, because being an American system it could be worked in countries not affected by the war. He granted the applicants an extension of the patents up to January 18th, 1931.

Fraudulent Conversion Charge.

AT the Guildhall on April 28th, Elie Stacey Charlier, company promoter, was again before Ald. Sir Harold Moore upon a charge of the fraudulent conversion of funds entrusted to him in respect of the formation of a Canadian electric railway company. Sir Frederick Mills, chairman of the Ebbw Vale Steel, Iron & Coal Co., whose name was said to have been used by the prisoner, gave evidence that, after investigation, he decided to have nothing to do with Charlier. The accused pleaded "Not guilty" and reserved his defence. He was committed for trial, bail of £250 being allowed.

Correspondence.

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession.

Hiding the Light.

Is the advantage of electricity for power purposes being brought to the notice of potential customers with sufficient energy? A brief investigation in a large town boasting an up-to-date system has revealed the following:—

A brattice cloth works was working both day and night shifts for the greater part of the year. Artificial light was supplied by two fairly large inverted gas fittings, the mantles of which were in a sad state of disrepair. Inquiries elicited the fact that, owing to draught, mantles were a costly item. The mills were driven by a steam engine of about 12 horse power supplied with steam at about 50 lb. pressure from a large and poorly lagged boiler. It is true a certain amount of steam was used for heating the drying rolls, though there does not appear to be any reason why this could not be done, and probably with more efficiency, electrically. The clay wash was thrown on by hand, a process that would be improved by the use of a small motor-driven pump. I was informed that the electric mains passed these works.

At a dry dock, the pumps, capable of dealing with the total contents of the dock in four hours, were steam driven. Should the dock be in use for but a short time, as during the painting or surveying of a vessel, the boilers are kept banked. At other times the fires are allowed to die out. The engines are non-condensing and will probably take in the region of 30 lb. of steam per h.p.-hour.

At a fuel works a self-contained power house of about 1,000-kW capacity has been installed.

A considerable amount of traffic takes place over about three miles of canal. The Canal Company will not tolerate self-propelling barges, its objection being that the wash disturbs the banks. The barges are, therefore, horse-drawn, though there appears to be no reason why a battery tractor could not be used with charging stations at the loading and discharging termini.

Many other smaller fields were met with, such as bakehouses, garages with plant, cabinet makers, saw mills, &c. These are not able to meet the cost of changing from gas or oil to electricity, and it is to be hoped that at an early date undertakings will hire out motors in such cases. Bakehouses, in particular, would provide a load when the distributing system is otherwise lightly loaded, especially were electric ovens used.

April 26th, 1927. **Electrician.**

A Domestic Load Diagram.

On page 630 of your issue of to-day, Mr. Ross's diagram of a domestic load for 24 hours, if my reading is correct, appears to total (hatched *areas*):—

	kWh.
Radiators	32.8
Water storage	17.0
Cooking	14.8
"Other" uses	14.4
Baths	4.0
Clothes washing	1.0

One day's consumption 84 kWh. Load factor 28 per cent.

The left-hand margin is divided into 13 numbered equal spaces with no unit named. Are the above *areas* kelvins?

Do you agree that if the unit is named and the size of home defined, it will materially add to the value of the diagram?

London, *April 22nd*, 1927. **Theodore Stevens.**

[The ordinates are, of course, graduated in terms of kilowatts; the areas, therefore, are kilowatt-hours.—EDS. ELEC. REV.]

Electric Water Heating.

Mr. Meares's article of the 22nd inst., and letter of the 29th inst., draw attention to a state of affairs much neglected by those who are presumed to have the industry at heart, and he is to be thanked for so doing.

As the load curve in my article is based on several years' practical experience gained in my own home, and in other homes similarly conditioned, Mr. Meares may safely take it as quite representative of its purpose. His suggested auto-switched water tank is the one solution of what may conceivably become a source of trouble as domestic load develops. That industrial load will undoubtedly take second place, as American experience is showing clearly to-day, and one fine day little communities of 10,000-20,000 homes or more will switch on 13,000-30,000 kW for the morning meal as against half that amount for the mid-day and evening meals. True, the period of high load is short. But it must be taken care of by the sub-station at least, and unless the domestic load curve is flattened appreciably by some such arrangement as Mr. Meares suggests, considerable capital is likely to be used increasing the power price needlessly.

On the other hand, presuming the point to be taken care of, even in the most residential localities, the road to cheap power is barred by the present high capital cost of the very means to obtain the end. I don't doubt for a moment that Mr. Meares's switch *could* be made at a reasonable price, but what of the water tanks? For tanks to meet all household needs the modest price of £10 to £25 must be paid. Where does the money go to in the production of such tanks? Even an ordinary household boiler can be converted for little more than the cost of an immersion heater plus some slag wool.

The lowest possible capital outlay is essential, and it is gratifying to note Mr. Sharp's broad hint at immediate favourable developments. The industry is on the verge of doing great work, and that with quite satisfactory remuneration, but will selfish profits override the willing horse and thwart the backer?

Manchester, *April 30th*, 1927. **Eric G. Ross.**

Cheap Electricity.

I should like to endorse a sentence in the letter of Mr. R. B. Matthews in your last issue, wherein he emphasises "the great difficulty there is in refuting the arguments put forward in favour of the small independent plant." The word "small" must not be given too narrow a significance in this connection. Indeed, there are many special instances where the larger the size of the independent plant the more difficult it is to refute the arguments in its favour. It must be remembered that the difference between the steam consumption per kelvin of a well-loaded 2,000-kVA steam turbine and one of 10,000 kVA is not very great for equal steam pressure and temperature, and this difference is usually much less than that portion of the cost per kelvin which is due to distribution.

Thus, in general, if a consumer has a load factor considerably higher than the average load factor of the local generating station, and if his plant is large enough to warrant the use of a turbo-generator exceeding about 1,500 kVA, the commercial advantage is very often in favour of the private plant. But this does not settle the question completely: there are considerations other than the purely commercial, which become more evident as experience of local supply increases. The owner of a works requiring electric power often realises that it is better for him not to divide his energies between his own proper business and the problems incidental to the

production of power. Although no accountant could put the value of this concentration into a profit-and-loss account, yet its effect is not the less real on that score.

William Cramp.

The University, Birmingham.
May 2nd, 1927.

The Salaries of Engineers.

The article in your issue of the 22nd inst. by "P.B.E." once again calls attention to the inadequate remuneration of 90 per cent. of electrical engineers. A short time ago a friend sought my advice with reference to making his son an electrical engineer. He was under the impression that if he and his family made the necessary sacrifices to enable his son to take a diploma or degree in electrical engineering, the latter's future on an adequately remunerated basis would be assured. I therefore felt it my duty—whilst not desiring to discourage his son from entering the electrical profession—to place the facts, so well brought out in the above article, before him. I also considered it was my duty to tell him that many friends of mine who are themselves engineers have avoided putting their sons into the engineering profession. This state of things is, of course, deplorable, and should be remedied. It is no doubt largely brought about through the ignorance of parents as to the real conditions in the engineering world, and to the great desire of boys—many of whom have exceptional ability—to take up engineering. With the same ability most of these boys would probably have done better to have followed some other vocation, which would have called for less sacrifice on the part of the parents and would have placed them in better positions to bring up and educate their own families in due course.

I make this contribution to the discussion because the remuneration and financial position of so many hard-working and able electrical engineers call for the attention of the leaders of the profession and industry, on whom the responsibility for rectifying the present position should largely devolve.

Ernest T. Williams.

London, *April 30th*, 1927.

A Commutation Problem.

The writer is at a loss for an explanation of the cause of trouble with some small dynamos supplied by a fairly well-known firm, and could not think of a better place to seek it than your columns (with your permission).

The machines are 10 amps., 30 volts, at 2,400 revs., and the trouble has been that, while they all ran apparently perfectly when new, or for some time after re-turning of commutators, in a few weeks they were sparking slightly, and this increased cumulatively until in three months the commutators would be black and scored, and would require turning up. Nothing in the way of changing brushes, adjusting the rocker, or cutting down micas has cured this, and the makers, on having an armature sent up, only turned up the commutator and sent it back.

Now, the armature winding is 432 conductors of 18 gauge, divided into 12 double coils, there being 12 slots (¾ in. wide) and 24 commutator bars. Armature diameter is 3¼ in., length 3 in. The magnetic and electrical loading data come out at about 20,000 lines per square inch in the gap, and 230 ampere-turns per inch of armature periphery, respectively, and this does not seem to be an abnormal design.

The writer's theory is that there are not enough slots, and, assuming the 18 wires in each double-coil assembly to be roughly evenly distributed in the half slot, the conductors are, at the best, on the average 7½ degrees from the correct neutral position when undergoing commutation, and this is enough to prevent sparkless running for any length of time. Slots are open and have parallel sides.

If this problem is not too trifling for insertion, an opinion from one or more of your many expert readers would be greatly valued.

A. O. Griffiths.

Caergwrle, *April 25th*, 1927

[Several letters have been received too late for inclusion in this issue.—EDS. ELEC. REV.]

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all sub-sequent proceedings will be taken.

1925.

27,151. "Apparatus for electrically indicating or transmitting to a distance the angular settings of any device." R. A. W. Watt. October 29th, 1925. (268,691.)

30,041. "Electrical indicating instruments and control systems therefor." W. G. Nagel Electric Co. December 5th, 1924. (244,085.)

30,365. "Aerial tuning with reaction units for radio service." J. Taylor and H. Rustige, jun. December 1st, 1925. (268,848.)

30,915. "Radio receiving apparatus." B. B. Minnium. December 8th, 1924. (244,131.)

33,005. "High-tension batteries." Ross, Courtney & Co., Ltd., and L. F. Brockman. September 16th, 1926. (268,856.)

1926.

143. "Armatures of electric motors and generators." F. W. Lanchester and Lanchester's Laboratories, Ltd. January 4th, 1926. (268,859.)

324. "Automatic and semi automatic telephony." Standard Telephones and Cables, Ltd., and E. P. G. Wright. January 5th, 1926. (268,862.)

407. "Wireless receiving apparatus." J. S. Northcote. January 6th, 1926. (268,866.)

415. "Mounting of electric fuses." English Electric Co., Ltd., and A. M. Pooley. January 6th, 1926. (268,867.)

556. "Alternating-current generators." Standard Telephones & Cables, Ltd. (Western Electric Co. Inc.). January 7th, 1926. (268,880.)

622. "Oil-immersed electric switches." A. Reyrolle & Co., Ltd., and W. Anderson. January 8th, 1926. (268,882.)

634. "Rotary electric transformers for coupling two alternating-current networks." Siemens-Schuckertwerke Ges. January 17th, 1925. (246,133.)

635. "Electric switch casings or containers." W. F. Holmes. January 8th, 1926. (268,883.)

639. "Telephone systems." Standard Telephones & Cables, Ltd. (F. de Fremery). January 8th, 1926. (268,884.)

704. "Sound-reproducing apparatus such as loud speakers." British Thomson-Houston Co., Ltd. January 9th, 1925. (245,796.)

715. "Thermionic amplifiers." E. H. Trump. January 9th, 1926. (268,887.)

1,140. "Automatic control of electric switches." G. Pailin and Ferguson, Pailin, Ltd. January 14th, 1926. (268,897.)

1,559. "High-frequency radio-transmission systems." C. Lorenz Akt. Ges. February 13th, 1925. (247,538.)

2,195. "Means for automatic regulation of electric amplifiers." C. Robinson, A. C. Timmis and C. A. Beer. January 25th, 1926. (268,906.)

2,253. "Variable pole windings for alternating-current dynamo-electric machines." Siemens-Schuckertwerke Ges. and H. Weinert. January 26th, 1926. (268,909.)

2,261. "Electrical switches." E. Dobson and Foster Engineering Co., Ltd. January 26th, 1926. (268,910.)

2,404. "Inductance coils used in wireless telegraphy and telephony." G. Turner. January 27th, 1926. (268,911.)

2,604. "Miners' electric safety lamps." T. A. Hodgkiss and W. E. Smith. January 29th, 1926. (268,913.)

2,856. "Systems of electric ship propulsion." British Thomson Houston Co., Ltd., and A. A. Pollock. February 1st, 1926. (268,914.)

3,161. "Electrolytic systems for protection of condensers, tanks, and such like vessels against corrosion." A. S. Gush and M. C. Gush. February 3rd, 1925. (247,198.)

3,345. "Control of electrically-driven lifts and cranes." Smith, Major and Stevens, Ltd., and P. H. Stevens. February 5th, 1926. (268,918.)

8,756. "Electric arc lamps." R. V. Boardman. March 31st, 1926. (268,958.)

10,271. "Telephone receivers." Sterling Telephone & Electric Co., Ltd., N. Blades and J. R. Beard. April 19th, 1926. (268,971.)

12,492. "Electric incandescent lamps." H. Wade (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). May 14th, 1926. (268,986.)

12,643. "Electric switching apparatus." E. B. Thurston. May 17th, 1926. (268,991.)

12,644. "Electric control systems." E. B. Thurston. May 17th, 1926. (268,992.)

13,898. "Apparatus for the electrolysis of water." Dr. L. Casale. June 1st, 1926. (268,998.)

15,430. "Coil junction box for signalling conductors." Felten & Guilleaume Carlswerk Akt.-Ges. July 9th, 1925. (255,038.)

15,897. "Apparatus for the production and application of ultra-violet rays." F. E. Kewley and S. F. Balls. June 24th, 1926. (269,014.)

15,906. "Sound conduits for sound-recording and sound-reproducing instruments." E. Finking. June 24th, 1926. (269,015.)

17,456. "Insulators." Soc. Nouvelle de la Manufacture de Porcelaines de Sainte Foy l'Argentiere. February 13th, 1926. (266,281.)

17,746. "High-tension cable." International General Electric Co. Inc. July 16th, 1925. (255,473.)

18,552. "Electrical apparatus, particularly wireless receiving sets." J. E. Bates. July 26th, 1926. (269,027.)

18,709. "Head-lights for vehicles." M. E. Power. July 27th, 1926. (269,029.)

19,086. "Wireless receiving set for compensating disturbances." Dr. S. Loewe. August 1st, 1925. (256,266.)

19,190. "Thermionic valves." A. A. Thornton (Radio Rhoren-Laboratorium Dr. G. Nickel Ges.). August 3rd, 1926. (269,032.)

20,386. "Means for regulating and synchronising electric motors and the like." Marconi's Wireless Telegraph Co., Ltd. August 19th, 1925. (257,272.)

20,721. "Electrically-heated tools for pyrography, soldering, and like purposes." H. Gamard. August 23rd, 1926. (268,631.)

21,181. "Process for removing the residual gases from the metal casings of electric discharge tubes." Siemens-Schuckertwerke Ges. August 28th, 1925. (257,620.)

21,598. "Brush gears for dynamo-electric machines." M. Urbinati. September 3rd, 1925. (257,935.)

21,934. "Methods and apparatus for fusing metals by the electric arc process for welding, cutting, and other purposes." British Thomson-Houston Co., Ltd. September 5th, 1925. (257,955.)

22,051. "Magneto generators." Ruppe Motor Ges. April 29th, 1926. (268,640.)

22,466. "Draw-out trucks for electric switchboards." Johnson & Phillips, Ltd., and P. M. Wood. September 11th, 1926. (269,051.)

22,487. "Electrical control apparatus." R. Maclaren. September 13th, 1926. (Addition to 254,821.) (268,645.)

22,699. "Sparking plugs and testing means therefor." C. E. Perks. September 15th, 1926. (268,648.)

22,792. "Centrifugal brakes for the call dials of automatic telephone installations." Fabriques des Montres Zenith. September 22nd, 1925. (258,800.)

24,175. "High-tension electrical transformers." Metropolitan-Vickers Electrical Co., Ltd., and H. B. Smith. October 1st, 1925. (259,223.)

24,555. "Process for manufacturing electric cables." Siemens-Schuckertwerke Ges. October 5th, 1925. (259,250.)

24,602. "Piezo-electric crystal control system for wireless transmission." Wired Radio, Inc. October 24th, 1925. (260,231.)

24,677. "Time-lag mechanism for electric relays." O. Janzen. October 5th, 1925. (259,253.)

26,456. "Electrodes for electric accumulators and a process for their production." P. Hagspihl. February 13th, 1926. (265,918.)

1927.

2,759. "Electric lamps." British Thomson-Houston Co., Ltd. January 30th, 1926. (265,237.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from April 27th :—

Supronic. No. 476,822. Class 5. Wire made of a copper-nickel alloy.—L.P.S. Electrical Co., Ltd., Avenue Road, Acton, W.3.

Semper Idem (lettering and design). No. 464,283. Class 8. Electric batteries and parts thereof.—Atlas Carbon and Battery Co., Ltd., 56, Southwark Bridge Road, S.E.1.

Spioscope. No. 478,415. Class 8. Optical apparatus and instruments.—Televisión, Ltd., Motograph House, St. Martin's Lane, W.C.2.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ABERDEEN.—Infirmary (£257,000); Dr. Kelly, architect.

ANDOVER.—Elementary school; Hampshire Education Committee.

ARGENTINA (Buenos Aires).—New Federal sanitary service (30,750,000 pesos) for the Government.

BEDFORD.—Millwrights' stores, Queen's Engineering Works; W. H. Allen, Sons & Co., Ltd.

BEXHILL.—Houses, Terminus Road, Mill View, and Collington Avenue; J. H. Lye, Chepbourne Road. Houses, Barnhorn Lane; Matthews & Co.

BIRMINGHAM.—Baptist Church Hall, Brook Lane, Billesley; trustees. Schools and assembly hall, Lyttleton Road, Stechford; trustees.

BRADFORD.—First portion of new infirmary scheme (£75,000, total scheme, £500,000); secretary, Board of Governors, Royal Infirmary.

BRIERLEY HILL.—Warehouse, Chapel Street, Pensnett, for Gill & Weaver, wholesale grocers (several thousand pounds).

BRIGHTON.—Factory, South Road; A. Darling & Sons, Ltd. 32 houses, Barnett Road; Hayward (Brighton), Ltd. Alterations, Abbots Hotel, Regency Square; C. E. Martin. Adaptation of Continental Hotel for municipal offices; borough engineer.

BURSLEM.—Electric furnaces, Furlong Tile Works; T. A. Simpson & Co., Ltd.

CANTERBURY.—Practical instruction school, for the borough E.C.; P. H. Warwick, city surveyor.

CHADDERTON.—Secondary school; Lancashire Education Committee.

CHELMSFORD.—50 flats, Boarded Barn estate; borough engineer. Warehouse, Victoria Road; Denham & Archer.

CRAYFORD (Kent).—Houses (71), Slades Green, for the U.D.C.; Clarke & Leahy, Ltd., builders.

DEWSBURY.—Church and Presbytery, at Moorthorpe; Holton & Fox, Corporation Street.

ELLESMERE PORT (Cheshire).—Church, Grace Road (£3,000); Slater Bros., builders.

FALKIRK.—Garage (£1,900); M. Millar, Woodside Garage.

GLASGOW.—Extensions at Knightswood Hospital for Corporation Public Health Department; medical officer. Cinema, &c., Byres Road, for Botanic Gardens Picture House, Ltd.; the secretary. Hall at Tallcross, for Salvation Army; officer commanding. 1,000 houses for Corporation; Balshagray Building Co. 1,000 houses, for Corporation; John McDonald (Contractors), Ltd. Electrical installation, Garscube Home; medical officer.

GRAVESEND.—School, Ordnance Road, for the borough E.C.; education architect.

GRAYS.—Extensions, Stifford Long Lane Hospital, for Orsett Joint Hospital Board; C. M. Shiner, architect, "The Barn." Dell Road.

GUILDFORD.—Assize Courts, Stoke Park; borough engineer.

HAMPSHIRE.—Mental colony, Portsmouth, Bournemouth, and Southampton Corporations.

HIGH WYCOMBE.—Factory extensions, Totteridge Road, for W. S. Toms, Ltd. Additions to chair factory, Richardson Street, for Smith & Co. Printing works extensions, High Street, for Bucks Free Press, Ltd.

IRISH FREE STATE (Queenstown).—Electric lighting at warehouse for the Pilotage Committee of the Cork Harbour Board.

IRLAM.—Central school, Lancashire Education Committee.

KINGSMEAD.—Hospital accommodation, residential school; Herts. Medical Officer.

LEAMINGTON.—Showroom, Russell Street; Midland Autocar Co. Additions, pump room filter house, for U.D.C.; R. P. Gathercole.

LEICESTER.—Mental institution, Birstall; city engineer.

LITCHURCH (Derby).—Church (£5,500), for the Wesleyan trustees; secretary.

LITTLE THURROCK (Essex).—Block of 22 shops, Purfleet-Tilbury Road, for F. C. Stark.

LLANBISTER.—School, for Radnorshire E.C.; T. W. Wishlade, county surveyor, Llandrindod Wells.

LLANDUDNO.—Suggested town hall extension; U.D.C. surveyor.

LONDON (Bow, E.).—Salvation Army Hall, Kerbey Street; Oswald Archer.

(Poplar, E.).—Additions, Dockland Settlement, East Ferry Road; J. Greenwood, Ltd.

(E.C.).—Building, 49-52, Houndsditch; Stone & Drew. Subway and vaults; Bankside Finance and Industries, Ltd.

(Finchley, N.).—Roman Catholic school; Catholic trustees. Canteen, Woodberry Grove; Metropolitan Electric Tramway, Ltd.

(Battersea, S.W.).—Adaptation of rooms at Central Library as museum; borough engineer. Synagogue, rear of 104, Bolingbroke Grove; D. Pierson.

(Hammersmith, S.W.).—Electric light and heating installation, Western ambulance station; chief engineer, Metropolitan Asylums Board.

MAIDENHEAD.—Adaptation of Crauford College as mental hospital; Middlesex C.C.

MANSFIELD.—Houses (113), Ravensdale estate, for the T.C.; R. Moore, builder, Stockwell Gate.

NEWCHURCH.—Elementary school, Lancashire Education Committee.

NORTHAMPTON.—Factory extension, St. James' Street; Wareings, Ltd.

PADIHAM.—Adaptation of West Bank House as clinic; Lancashire Education Committee.

PAIGNTON (Preston).—Lecture hall; Bridgman & Bridgman, the Palace Avenue, architects.

POCKLINGTON (East Yorkshire).—Assembly hall (to seat 500) for Pocklington School; Crickner & Foxley, architects, 1, Lincoln's Inn Fields, London, W.C.2.

PORTSLADE.—'Bus garage, Victoria Road; Southdown Motor Services, Ltd.

PORTSMOUTH.—Bank, High Street, Cosham; Lloyd's Bank, Ltd. Boiler house, Eldon Street, for Portsmouth United Breweries; Gallaways, Ltd. Factory, off Target Road; Hays Waterproof Glue Co., Ltd. Alterations and additions, 109-115, Commercial Road; Lloyd's Bank, Ltd. Drainage scheme at Cosham (£68,000); city engineer.

PRESTWICH.—Salvage and disposal scheme; U.D.C. surveyor. Shops and houses for Messrs. J. & W. Leach and Sons, Bury New Road; W. F. Pinfold, surveyor.

ST. ANDREWS.—Residence hall for men students for St. Andrews University Court; the principal.

SOUTHAMPTON.—Proposed theatre, Commercial Road, for Moss Empires, Ltd., London.

STAFFORD.—New St. John's Church; Rev. Frank W. Jones, vicar.

STIFFORD (Essex).—Alterations and additions, Ford Place, for Col. R. M. Laurie. Development of estate, Nutberry, for residences, for Col. F. H. D. C. Whitmore.

STIRLING.—Police court and offices (£11,750), for the T.C.; burgh surveyor.

STOKE-ON-TRENT.—Extensions, nurses' quarters at hospital; city engineer. Electrical installation, Saw Mills, Copeland Street; F. G. Chambers & Co., Shelton Wharf.

STOWE (Bucks).—Chapel, Stowe School (£40,000); Sir Robert Lorimer, architect.

SWADLINCOTE.—School, Newhall, for Derbyshire E.C.; H. W. Skinner, clerk, County Offices, Derby.

THAMES HAVEN (Essex).—Power station, for the London and Thames Haven Oil Wharves, Ltd.

TROWBRIDGE.—Bank, Fore Street, for the Westminster Bank, Ltd.

TYNEMOUTH.—73 houses, Ogle Terrace; 15 blocks of maisonettes, Balkwell; borough engineer. Smallpox hospital; borough engineer.

WALSALL.—Additional 40 houses, Rushall, for the R.D.C.; surveyor.

WARRINGTON.—School, Bewsey, for the borough E.C.; director of education.

WEM.—School, and extensions to Grammar School, for Salop E.C.; director of education, Shrewsbury.

WEST LOTHIAN.—Central school at Bo'ness; clerk, Education Authority, Bathgate.

YORK.—Church and school, Fulford Road; Christian Scientist Community.